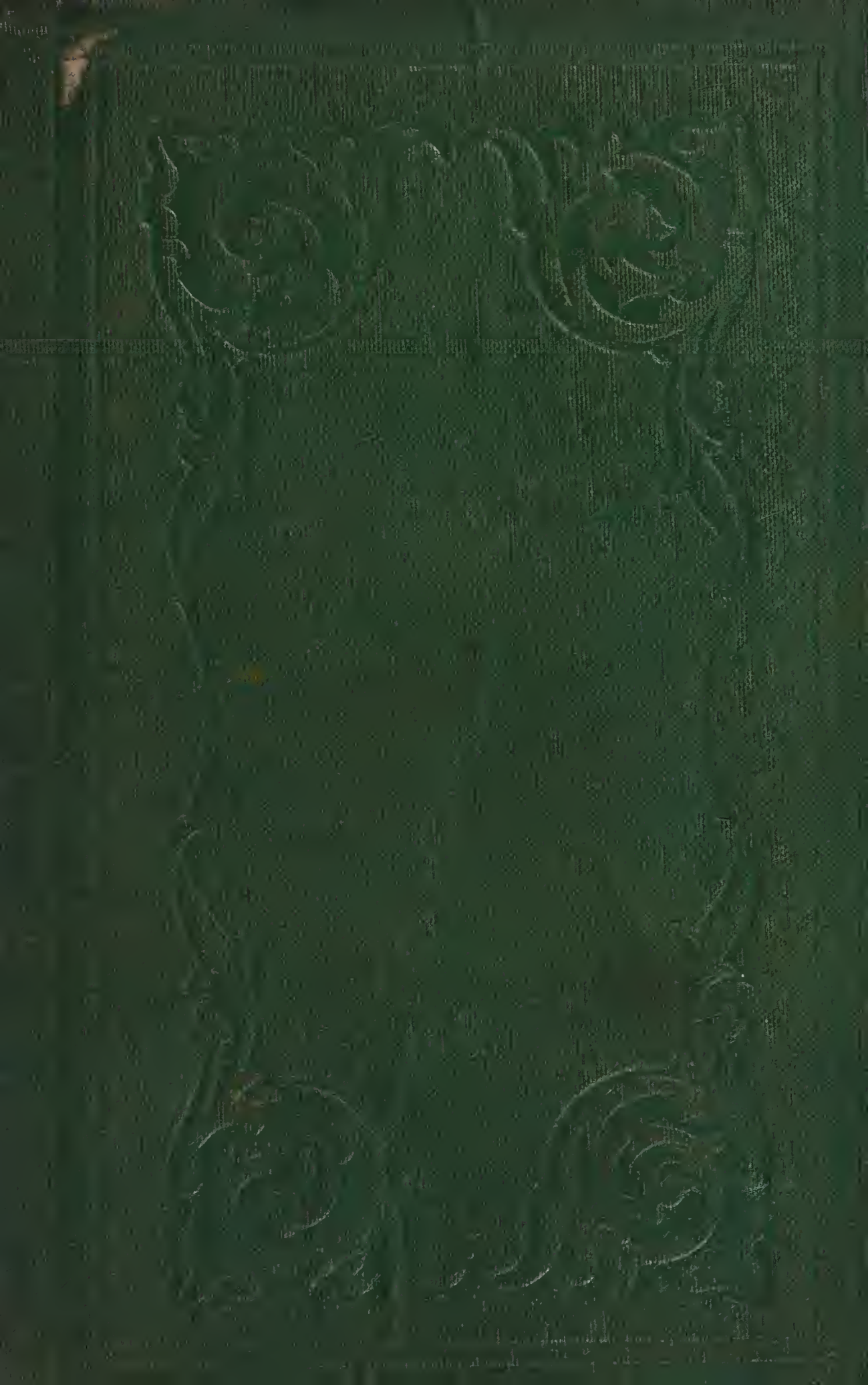

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THE

# ENTOMOLOGIST'S ANNUAL

FOR

# MDCCCLVII.

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VIRES ACQUIRIT EUNDO.

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Library Edition.

LONDON:
JOHN VAN VOORST, PATERNOSTER ROW.

MDCCCLVII.

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# PREFACE.

On this our third appearance before the public, we assume a triple form—in other words the present Annual is issued simultaneously in three editions.

The Library Edition in cloth gilt, printed on superior paper, and with more carefully coloured plate.

The Original Edition in yellow boards as heretofore, and The People's Shilling Edition in thick paper wrapper, with uncoloured plate.

By this method we hope to reach, though we fear we cannot expect to satisfy, all classes of readers, and we trust it will be found that there is no falling off in the amount of interesting matter provided by our contributors.

At the present day, when so much stir is being created at the neglect which all orders of insects, save the Lepidoptera and Coleoptera, experience from British Entomologists, a Synopsis of the British Dragon-flies, from the pen of so competent an authority as Dr. Hagen, will be welcomed as a real step towards further progress.

Mr. Janson's paper on Ants'-nest Beetles will be read with interest by many who have never yet troubled themselves with that curious page in Natural History, "the love of the ant for the beetle."

We apprehend that on our next appearance we shall be compelled to enlarge our size; we shall probably then have more than one new contributor, and more than one group of

insects, hitherto neglected, will probably be made the basis of an article. If the anticipated expansion in bulk takes place, we do not see how we can prevent an increase in price. At present, though we print three thousand, no margin of profit is left, and any outlay in advertising entails a loss.

If our readers should decide for us that we might safely print even a larger issue, we would willingly increase in bulk without any additional charge—but time will show.

A year hence the cheap Edition of Kirby and Spence, of which the fourth thousand is already advertised, will have had time to produce fruit, and to swell our crop of readers.

The "Times" recently, in an article on Book-Hawking, asks "what becomes of the gift of reading among the labouring poor of this country?" and then, commenting on the class of books which are hawked about the country, observes, "that though book-hawking may supply only the vilest trash, it is in itself a natural machinery for supplying the country poor with literary food. The poor will buy books; and if they have any money to spare from their household expenses, little as it may be, this is a very good use of it, provided the books be good. It is much better, too, that they should buy books than that books should be given in charity. People value what they buy a great deal more than what comes to them by mere official charity." This is *very* true.

In another column of the "Times," of the same day, we find another article on the same subject, from which we quote the following: "Many there are who would turn away from a professedly religious book, who might yet be tempted by some useful or entertaining secular work." And this as true of *scientific* books as of *religious* works.

A writer in the "Times," a few days later, alluding to this

very paragraph, remarks, "The great fault of those who choose books for the working classes is in their desire that they shall read none but "good books;" that is, as they the choosers would express it,—"books which should contribute to the religious and moral improvement of working men." The greater part, therefore, are religious books, and the remainder no doubt highly moral and instructive; but, unhappily, just the sort that the majority of working men would open only to shut again, after glancing over half a page. It is entirely forgotten that a taste for reading is yet to be created among working men. To give such religious book or books inculcating morals simply, without their being at the same time very entertaining—a quality often deemed improper for labouring people—is only to make them feel a disgust for reading."

"Labouring men, and workmen generally who do read, are affected by reading precisely the same as the classes above them. They are entertained with the narration of what they can understand and appreciate, and oppressed with dulness or 'bored' with what they do not understand or appreciate. Books, therefore, for their use must be highly entertaining, if you would have them voluntarily read or purchase them. But as with the greatest number a taste for reading has yet to be created, books must be procured for them of a sufficiently engrossing tendency to their minds to overcome the distaste, or perhaps the difficulty, of reading them."

It may seem strange to some that we should say so much about "book-hawking" in these pages; but we have repeatedly felt the difficulty which some of our poorer readers have in getting possession of our works. They get to hear of them in some round-about way, and want to procure them, but the bookseller in the nearest village or town, when ap-

plied to, has not the "Entomologist's Annual" in stock, perhaps he has not even heard that there is such a publication,—and is it natural that he should be at the trouble of specially procuring from London a book which he fears he may never sell? for the party applying for it at the time is a perfect stranger to him and may never enter his shop again; the applicant, on the other hand, does not like the notion of making a deposit beforehand of the price of the book, and so we lose a reader and our friend misses the instruction he was anxious to obtain.

I hope that all who wish for any information on Entomological subjects will still, without hesitation, continue to apply to me.

H. T. STAINTON.

Mountsfield, Lewisham,
*December 4th*, 1856.

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## EXPLANATION OF PLATE.

Fig. 1. *Oxylæmus cylindricus*, see page 79.
2. *Laverna conturbatella*, see page 107.
3. *Laverna Raschkiella*, see page 108.
4. *Trochilium Scoliæforme*, see page 114.
5. *Mixodia Hawkerana*, see page 119.
6. *Laphygma exigua*, see page 115.
7. *Hetærius sesquicornis*, see page 77.
8. *Adelops Wollastoni*, see page 70.
9. *Cryphalus binodulus*, see page 83.

"In former times there were many men eminent in all the branches of human learning, but, as regards the great masses of mankind, the avenues of knowledge were to a certain degree closed; but the arrangements of later periods, which are improving from day to day, tend to diffuse among the great mass of the community, or, at all events, among all who are willing to receive instruction, the results of the labours of science and the fruits of the investigations of the learned.

"The intellectual qualities, as well as the moral feelings of our nature, are scattered broadcast over the face of the earth. We find them everywhere, in the lowest classes as in the highest." *Lord Palmerston, at Manchester, November 6th,* 1856.

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## ERRATA.

Page 47, line 6 from bottom, *after* "Harris's figure" *insert* "(Exposition, pl. 27, fig. 2)."
„ 51, line 19, *for* "*Æschnia*" *read* "*Æschna.*"
„ 55, line 10 from bottom, *after* "(♂);" *insert* "(♀)."
„ „ line 2 from bottom, *after* "(♂);" *insert* "(♀)."
„ 57, line 4 from bottom, *after* "Dublin" *insert* "University."
„ 63, line 10 from bottom, *for* "Whitsund" *read* "Whitsand."
„ 64, line 2, *erase* "Dej. Spec."
„ 70, line 14, *for* "Fig. 7" *read* "Fig. 8."

# THE SEASONS.

(By the Editor.)

It is well for Entomologists it is not always summer. Summer is to the eager collector a period of such intense activity,—moths to be found here, beetles there, caterpillars in other directions, then insects coming out in the breeding-cages, insects spread out on the setting-boards, live insects too,—those horrid mites running about on the setting-boards rubbing off a leg here, an antenna there, or, if the insect be very precious, carefully removing the wings,—(the clever rascals)—that it is well the duration of summer is limited; few would like to have to work for even six months at the full summer high-pressure rate.

A member of parliament in July can have some conception of the labours devolving on an Entomologist during the summer months; but, unfortunately, the M. P.'s labours are of a less exhilarating nature: whilst he is drearily dozing over an endless and unmeaning debate, the Entomologist is more pleasantly employed in culling his moths from his sugared trees; he is in the open and fresh air of the woods and heaths, unexposed to the ventilating draughts which a Reid inflicts upon the Commons—his acquaintance with reeds is limited to those growing in marshes; though it strikes one as not improbable that in days long gone by, *Wainscots* and other marsh insects must have occurred freely between

Westminster and Milbank, and probably the very ground on which the Penitentiary stands served as their metropolis.

When the M. P. sits down to his daily digest of blue-books, the Entomologist is busy setting out his captures of the previous evening; when at 11 A.M. the M. P. goes to the House to attend a committee, and amuse himself with hearing a witness examined for three or four hours, the Entomologist (supposing he had nothing else to do, which is, in fact, however fortunately rarely the case) sallies forth and proceeds to interrogate nature, by peering over the mossy trunk of a tree, beating the branches and raking in the roots of the grass—and whether he finds any thing, or merely finds indications of where something has been, all is gain to him, and on his return home he forthwith opens his journal and makes an entry of what he has seen and met with.

The post arrives: to the M. P. it brings budgets of letters, some from his constituents asking for all imaginable and unimaginable things (just as we are often asked for a small *cheap* book with *coloured* figures and descriptions of *all* our British insects); to the Entomologist it brings packets of letters applying for some rarity of which he had announced the capture in the previous Saturday's "Intelligencer." Alas! a great number of the letters received both by the M. P. and the Entomologist show but too clearly the selfishness of the writers.

Winter is not a period of the year in great favour with Entomologists, but it is not without its uses. Things which we least appreciate are often of the greatest service to us. Now, in the good old times of farming, fields were allowed to be fallow at certain intervals, in order to recruit the exhausted condition of the ground—a fallow field was itself unproductive, but was destined to be the cause of greater

production hereafter—so with the winter of the Entomologist: the almost entire cessation of out-door Entomological labours drives him to look over and *study* his collection, and sets him a re-reading his Entomological books, and he is surprised to find how much more pregnant with meaning they now appear than they did the previous winter; many passages of which he did not gather the full purport before, now he at once understands, because they confirm some of his own experience during the past season: he makes notes of insects to be looked for at particular times and in particular places during the ensuing season, consults the herbarium of some friend, and rubs up his Botanical knowledge in order that he may learn to know some particular plants, on which he finds some caterpillars are only to be found. Grant that during mid-winter the Entomologist says daily, "Oh! I wish it were summer!" Yet that very wish drives him to work harder at his studies in order that when summer comes he may be the better prepared for it. The summer he knows goes but too quickly, and there is hardly a possibility of finding time during the summer to rummage books and see what one should be looking for; those who are wise will get all this book-work done beforehand, and those are wise who are not given to *procrastination*.

Nor let it be for a moment thought that these remarks about study and making notes are addressed only to our elder readers. Our own literary labours commenced before we were fourteen, by the compilation (from Rennie's Conspectus) of a Calendar of British Butterflies and Moths, which showed under each month the species occurring in that month, whether they were plentiful or scarce, and in what parts of the country they occurred. This list filled six copy-books, and though not intended for publication, only for our own private use, proved to us most serviceable; and we strongly

recommend such of our juvenile readers as want some occupation for their *winter evenings* to try the same or some similar dodge. By writing a thing out yourself, you learn it more thoroughly than by merely reading it (don't you find this so, when you have to write out your lessons?), and you will soon acquire a habit of tabulating any information which you wish to have clearly placed before you.

As winter advances, the feeling of intense anxiety to be *doing* something increases in the Entomologist to an almost morbid degree, and the first tolerably tempting day in January or February you are sure to see him a-field.

Spring comes, and then the Entomologist emerges, as it were, from his long pupa state, and enjoys all the pleasures of a new existence. He is a year older and a year wiser than he was the spring of the previous year: to the experience of the preceding spring and summer, he has added the knowledge gained by his winter studies; and though in no great hurry to think that he knows everything, he finds the immense advantage of the increase of knowledge he has obtained in the twelve months. This is the great charm of knowledge; the pleasures of that we have acquired, urge us to increased industry in adding to our store. Were summer to come immediately after winter, the transition would be so great that the Entomologist would not have time to adapt himself to the altered state of things; but by the gradual advent of spring, he has the opportunity afforded him of bit by bit accustoming himself to a complete change of occupation. The very variableness of the weather too in spring is not without its uses in trying the steadiness of purpose of the Entomologist: by persevering in collecting during the cold ungenial weather of April, and facing sundry cool showers of rain and sleet, he testifies that there is some *stuff*

in him, and it is only when it meets with obstacles and overcomes them, that we appreciate the full force of any strong current. Besides, this same ungenial temperature, which often comes suddenly after a week of pleasant balmy weather, enables the Entomologist to cultivate a cheerful disposition; like Mark Tapley, he can then show whether he has the capability of being "jolly" under aggravating circumstances; it is quite absurd to say you can cultivate cheerfulness when everything goes smoothly—it is when things will perversely go wrong, that one's philosophy gets put to the test.

Moreover, the Entomologist must be sharp indeed, if he has not put off some of the winter's work to the last, and probably he finds, as the labours of the spring season begin to press upon him, several matters of importance had been overlooked in the winter, but which yet it will be desirable to get completed before the summer sets in, in full earnest. But, alas! how few have the foresight and industry to get all their work ready beforehand.

Autumn, though it has less to be distinctively said of it than the previous seasons, cannot be passed altogether unnoticed. Long ago we remember we used to slacken our Entomological energies towards the close of the season, and used to pass unheeded in October moths, which we should have eagerly chased in March; as it was with us then, perhaps it now is with many of our readers. At the close of the day one gets lazy and indisposed to work, at the close of summer a like feeling of drowsiness overtakes the incipient Entomologist. Of course we can understand that what with "Intelligencers," "Naturalists," "Substitutes" and "Zoologists," it is less easy to drop off quietly to slumber than it was in our juvenile days, when such things were unknown. Yet autumn is a prolific time for many things, and those

who are energetic will find that though one has much "game" to look after out of doors,—for is not the ivy in bloom in October and November? the arrangement of summer captures, and determination of the names of species, will afford plenty of in-door occupation; so that those who wish to be Entomologically employed can amuse themselves both with summer-work and winter-work.

# IS ENTOMOLOGY PROGRESSING?

(By the Editor.)

An apparent increase of crime may be caused by a greater efficiency of the police. More criminals will be captured, more will be tried, and more will be convicted: statistical tables will show, to the horror of the civilized portion of the community, *a great increase of crime*, whereas after all the increase is not in the *crimes committed*, but in the *criminals detected*.

In like manner many persons are apt to take up the idea that a greatly increased number of persons are now occupying themselves with Entomology, simply because, owing to the greater efficiency of our Entomological police, a collector can hardly make a day's excursion without finding his doings in print. So that the apparently increased activity of our collectors may only arise from the movements of each being noted.

That this publication of each other's movements reacts favourably upon Entomologists may readily be admitted: it produces the sympathy of a crowd; each finding himself no longer isolated, and working only for his own amusement, finds himself placed in a higher and more unselfish position; he works now for the amusement and instruction of others as well as for his own.

Each collector may thus be led to more vigorous exertions, and an increased crop of insects will be found in his store

boxes at the end of the season; for till one gets to know of those who are in want of one's duplicates, but little attention is paid to the collection of them.

But granted that each collector is more active, and granted even that there are a few more collectors than formerly, still we may recur to the question—Is Entomology progressing?

Entomology is the study of insects; the collector catches insects, but it does not follow that he studies them; to assume that an increase in the number of collectors necessitated the progress of Entomology, would be as rational as to assert that Mineralogy was now making vast advances, because so many had gone to the gold-diggings of California and Australia.

In 1850 the following passage appeared in the pages of the Zoologist.

"I imagine all persons commence a collection of insects with the notion that they are thereby making something pretty to look at. Yet, the desire to have them named and arranged, treads very closely on the heels of the desire to form a collection. And this naming and arranging is no child's play, no baby-work: if they are to be named, they must be named correctly; if they are to be arranged, whose arrangement should be followed? In the first place, how is the collector to ascertain the names of the species he has collected? He may consult books, and refer to descriptions or figures, or he may compare specimens with some collection which is supposed to be rightly named; and nine-tenths of our collections, I regret to say, are named in this latter way: they are copies of copies; they have never been compared with the original; if there was a blunder in the copy, still they copy it, having no notion of correcting it. The consequence has been that our collections of *Lepidoptera*, and

probably of other orders, were a disgrace to the age and to the country. This is now to be rectified; a new catalogue of British *Lepidoptera* (except the *Fumeæ*) has appeared: all collections are to be named and arranged by this,—but are they not still all to be copies? Who refers to the original descriptions to prove their correctness? Every one takes on trust the saying of this or that Entomologist, and names his cabinet accordingly. Why is this so? This is an inquiring age: we do not generally take things on trust in this way, but we make diligent search and inquiry in order to prove them."

The evil here complained of still exists. But very few dive into the literature of Entomology, but very few devote themselves to the analysis and correction of genera. Nay a recent writer in the Natural History Review is actually so violently opposed to the further study and consequently improved arrangement of a group of insects, that he energetically protests against any re-arrangement, because it will be so inconvenient to our collections; a collection is not to be used for the furtherance of science, but is to form a bar to its progress. We have often been accused of being severe upon our countrymen, but we were never guilty of so great a libel on them as the reviewer in question. The Natural History Review, we may observe *en passant*, has done wisely to import its best paper from abroad, so great is the lack of Entomological writers in this country.

A fair idea of the crop of Entomological writers may be formed by referring to the papers published in the Transactions of the Entomological Society of London. It is well known that every paper read before that society is referred to a committee called the Publication Committee, which decides whether or not the paper is worthy of publication; so that the list of contributors may be assumed not to be a

list of mere scribblers, but to be restricted to those who have elaborated something of scientific value.

The following is the list of contributors to the Transactions of the Entomological Society, in each year from 1846 inclusive.

| | | |
|---|---|---|
| 1846.. | Rev. F. W. Hope ..... | 5 Contributors; of whom 2 were new. |
| | *J. W. Douglas, Esq.* ..... | |
| | J. O. Westwood, Esq. .... | |
| | R. Templeton, Esq. ..... | |
| | *Rev. T. Savage* ..... | |
| 1847.. | J. W. Douglas, Esq..... | 6 Contributors; 1 (a foreigner) new. |
| | W. W. Saunders, Esq. .... | |
| | J. O. Westwood, Esq. .... | |
| | J. E. Gray, Esq. ..... | |
| | W. F. Evans, Esq. ..... | |
| | *Dr. Schaum* ..... | |
| 1848.. | J. O. Westwood, Esq. .... | 6 Contributors; 3 new. |
| | J. W. Douglas, Esq. ..... | |
| | *W. S. Dallas, Esq.* ..... | |
| | Edward Doubleday, Esq.. | |
| | *William Wing, Esq.* ..... | |
| | *H. T. Stainton, Esq.* ..... | |
| 1849.. | J. F. S. Parry, Esq. ..... | 7 Contributors; 1 new. |
| | W. S. Dallas, Esq. ..... | |
| | J. O. Westwood, Esq. .... | |
| | W. W. Saunders, Esq. .... | |
| | *Thomas Desvignes, Esq.* .... | |
| | J. W. Douglas, Esq. ..... | |
| | H. T. Stainton, Esq..... | |
| 1850.. | H. T. Stainton, Esq. ..... | 7 Contributors; 1 new. |
| | F. Smith, Esq. ..... | |
| | S. S. Saunders, Esq..... | |
| | Adam White, Esq. ..... | |
| | J. W. Douglas, Esq. ..... | |
| | W. W. Saunders, Esq. .... | |
| | *W. C. Hewitson, Esq.*..... | |
| 1851.. | J. W. Douglas, Esq. .... | 8 Contributors; 2 new. |
| | W. S. Dallas, Esq. ..... | |
| | H. T. Stainton, Esq. ..... | |
| | W. W. Saunders, Esq..... | |
| | J. O. Westwood, Esq. .... | |
| | F. Smith, Esq. ..... | |
| | *R. F. Logan, Esq.* ..... | |
| | *John Davy, Esq., M.D.* .... | |

| | | |
|---|---|---|
| 1852.. | J. W. Douglas, Esq..... | 9 Contributors; 2 new. |
| | J. O. Westwood, Esq. .... | |
| | *John Curtis, Esq.* ..... | |
| | F. Smith, Esq. ..... | |
| | W. S. Dallas, Esq. ..... | |
| | W. C. Hewitson, Esq. .... | |
| | W. W. Saunders, Esq. .... | |
| | *H. W. Bates, Esq.* ..... | |
| | S. S. Saunders, Esq..... | |
| 1853.. | W. Wilson Saunders, Esq. . | 8 Contributors; 3 new. |
| | *Mr. W. Varney* ..... | |
| | G. R. Waterhouse, Esq. .. | |
| | J. W. Douglas, Esq..... | |
| | F. Smith, Esq. ..... | |
| | J. O. Westwood, Esq. .... | |
| | *A. R. Wallace, Esq.* ..... | |
| | *John Scott, Esq.* ..... | |
| 1854.. | W. C. Hewitson, Esq. .... | 10 Contributors; 1 new. |
| | Edward Newman, Esq..... | |
| | John Curtis, Esq. ..... | |
| | John Davy, Esq., M.D. .. | |
| | W. W. Saunders, Esq. .... | |
| | J. O. Westwood, Esq. .... | |
| | G. R. Waterhouse, Esq. .. | |
| | H. T. Stainton, Esq..... | |
| | F. Smith, Esq. ..... | |
| | *J. S. Baly, Esq.* ..... | |
| 1855.. | G. R. Waterhouse, Esq. .. | 7 Contributors; 3 new. |
| | *E. W. Janson, Esq.* ..... | |
| | F. Smith, Esq. ..... | |
| | *J. G. Desborough, Esq.* .... | |
| | J. O. Westwood, Esq. .... | |
| | E. Newman, Esq. ..... | |
| | *John Lubbock, Esq.* ..... | |

Thus in the years 1846—1850, the average number of contributors per annum was $6\frac{1}{5}$, and in the five years eight new writers made their début.

In the second period of five years 1851—1855, the average number of contributors per annum was $8\frac{2}{5}$, which includes eleven new writers; an increase in both respects of one-third. Taking therefore this as a criterion, we may infer that Entomology *is* progressing.

Yet at the same time the progress is not great, and by no means to the extent that is actually desirable. Either Entomologists are not clever, or clever men do not become Entomologists; a disagreeable statement no doubt, but one from which apparently there is no escape, and we never shirk stating the truth, just because it happens to be unpleasant.

At the present day the collectors of beetles in this country want a clever man to write them a Manual of British Beetles; and whether we hunt high or low amongst our Coleopterists, the fitting man cannot be found. Surely this state of things will not always last!

# SUPPLEMENTAL LIST

OF

# BRITISH ENTOMOLOGISTS.

(By the Editor).

The List of Entomologists in last year's Annual having been generally accepted as one of the most useful portions of that periodical, a Supplemental List is now given of all those Entomologists whose names and addresses have reached us since last year, and who were not unwilling to be thus enumerated. Very few of these were *desirous* of being thrust upon the public; we had to seek them out in their retreats, pathetically appeal to the Entomological patriotism, and then came the modest reply, "I should not have thought myself worthy of being classed amongst Entomologists, but if you think any good purpose would be served by the insertion of my name in your Supplemental List, I leave you to do as you think best;" so that the whole responsibility of publishing this list has been thrown upon our shoulders.

However we entertain no qualms but what it will be beneficial: each unit thus obtains a better chance of being thrown in contact with other units of similar dispositions. An amusing result of our last year's list has become known to us. Two gentlemen were on visiting terms and had known one another for some years, but neither had any idea that the other collected insects, till one of them finds his friend in our

"List of Entomologists;" thereupon the next time they meet there ensues the following conversation:—A. says to B., "I had no idea you collected insects." B., "Oh! yes; I have been collecting many years; have you any taste that way?" A., "Yes; and I have often wanted to meet with a kindred spirit, and little thought that you were one."

A good many of our new names are school-boys; in our eyes this enhances rather than detracts from the value of the list. Each "incipient Cuvier," who finds his name thus paraded to the public gaze, will feel that he cannot relax his efforts without discredit, that to have had a fever for one pursuit and afterwards to have grown cool therein will be a damaging blow to his character for perseverance, which he will not be disposed rashly to encounter.

The following alterations have taken place in the Address or Title of the Entomologists enumerated in our last year's List:—

*Changes of Address.*

Buxton, E. C., Esq., *Daresbury* Hall, near Warrington.

Drane, Robert, *22, Frederick Street, Cardiff.*

D'Urban, W. S. M., Esq., *Canada.*

Hodgkinson, Mr. J. B., 41, St. Peter's *Street*, Preston.

Plint, Henry, Esq., *25, Tokenhouse Yard, London.*

Reading, J. J., Esq., *42, Gibbons* Street, Plymouth.

Shield, Mr. Richard, *9, Shrub Place, Leith Walk, Edinbro'.*

Smith, Frederick, Esq., British Museum, and *27, Richmond Crescent, Richmond Road, Islington.*

Wollaston, T. Vernon, Esq., *10, Hereford Street, Park Lane.*

*Changes of Title, &c.*

Bostock, *Rev.* G. J., *Bideford, North Devon.*
Hogan, *Rev.* A. R., *Corsham, Wilts.*
Jones, *Captain* John M., *Dolarddyn Hall, near Welshpool, Montgomeryshire.*
Newnham, *Rev.* P. H., *Guildford,* Surrey.
Norman, *Rev.* Alfred Merle, Christchurch, Oxford.

## Supplemental List of British Entomologists.

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# HYMENOPTERA.

## Notes and Observations on the Aculeate Hymenoptera.

By Frederick Smith.

Another year has passed since we were called upon to register the observations and discoveries made in this country, in the order *Hymenoptera*. At the commencement of an Entomological season, it is to us an agreeable pastime, to speculate on what may possibly occur during the ensuing campaign. We have possibly obtained some little insight, have made some trifling observation, which the coming season, we fondly hope, will give us an opportunity of following up, and of thereby unravelling some hitherto impenetrable mystery; but alas! we cannot "look into the seeds of time," nor tell "which grain will grow."

The records of the past season contain some interesting discoveries of which our speculations had no foreshadowing: these, however, will doubtless appear, to some, matters of small account, and our annual register scarcely worth the trouble of perusal; but, in what estimation should we hold a register of the doings of our Entomological predecessors of the year 1806? Our best thanks should be awarded to Mr. Marsham, for *his list* of *Coleoptera*—with what a relish we should dwell upon the localities pointed out by that eminent Entomologist! Special indeed would be our obligations to the Rev. William Kirby, for having noted down

the *localities* of his unique species of *Andrenidæ*, and for the interesting observations which he made upon their economy. These reflections are somewhat consolatory, and we look forward with hope, that in the year 1906, a grateful posterity will award to us their warmest acknowledgments, and will duly estimate the energetic endeavours of Mr. Stainton in the cause of Entomology.

We have to chronicle but few notable discoveries of new species, but these are extremely interesting, and we trust the interest will be increased, by additional observations on the habits and economy of the species.

This paucity of novelty is in a great measure attributable to the fact of there being so few labourers in the fruitful field of Hymenopterous research ; notwithstanding the engrossing interest which attaches to the study of the *Hymenoptera*, he who enters upon it must expect frequently to toil long and laboriously, uncheered by the encouraging presence and fellowship of brother Hymenopterists. To one who has quietly, but perseveringly, laboured year after year on this enchanting ground, it is a matter of much regret that so few have shared the pleasure which the study of the *Hymenoptera* so peculiarly affords.

The individual histories of the *Aculeata* are amongst the most instructive, entertaining and marvellous records which have appeared in the entire range of Entomological literature.

In support of the position which we have assigned to the *Hymenoptera*, it will only be necessary to examine carefully a bee or a wasp ; what insect surpasses either of these in intelligence, or in the instinctive faculties which they possess ? in structure, how admirable in all respects ! unsurpassed in power of flight, gifted with powers of vision in a superior

degree to many other insects, and possessing a development in other respects unsurpassed by any of the tribe.

Possessed of the above qualifications, we cannot hesitate to place the *Hymenoptera* in the highest rank of the orders of insects; such being the case, it is somewhat surprising, that so few Entomologists avail themselves of the opportunity of studying the most attractive pages in the book of nature, and of tracing out themselves, histories equally marvellous as those which Reaumur and others have so graphically described.

During the past season, the minds of Entomologists have been powerfully directed to a most important subject, connected as it were with the very foundation of the science; namely, that of *specific distinctions and their variations.* The masterly work upon this subject by Mr. Wollaston has directed our attention specially to the inquiry, and it appears to us that a few parallels to some of the instances recorded by Mr. Wollaston, of the effect of climate upon particular species, may neither be out of place, nor uninteresting in the pages of an Annual.

In 1853, we recorded an opinion, that the *Halictus flavipes* was found throughout Europe, in Nova Scotia, in Ohio, and in North America. To the geographical range of this species, we appended a note, to the effect that "the specimens from America are larger than any yet observed from other localities, but that in other respects, no difference could be detected; the sculpture of the metathorax and the neuration of the wings being the same. The *Halictus parallelus* of Say is certainly the *representative* of the *H. rubicundus* of Europe, if indeed it be not the same species, slightly altered by climatal influences. The *Andrena pilipes* of this country, I consider to be identical with specimens from North Africa; and we possess specimens of *Andrena Clark-*

*ella* from Nova Scotia which cannot be separated from examples taken in Scotland; yet both are much less rich in the colouring of their pubescence than any individuals found in the London district. Perhaps the most widely distributed species of bee known is the *Megachile centuncularis;* in the British Museum are specimens from all parts of Europe, including Finland and Lapland; others from North America, Hudson's Bay and Canada: not the slightest difference can be detected in examples from the above widely distant localities. *Osmia hirta*, of the European Continent, is found in the Island of Madeira and also in the Canary Islands; *Osmia ænea* of this country is also found in the Canary Islands. *Nomada ruficornis* occurs in this country and in North America. The only species of *Bombus* from North America, which appears to be identical with the European one, is the *Bombus hortorum;* this insect was captured by Sir John Richardson, at Lake Winnepeg, on his last Arctic expedition. The *Vespa vulgaris* of Europe cannot be specifically distinguished from what has been considered to be its American representative. The *Pompilus Americanus* we have regarded as the American form of the European *P. fuscus*—not to multiply examples, we will only mention the well known insect *Chrysis ignita*, the common ruby-tailed fly, which is found in no way differing from British examples, at the Cape of Good Hope. That difference of locality is an index to difference of species, need scarcely be denied; but nothing can possibly be more insecure than building upon such an hypothesis: the knowledge which we have acquired of some species of *Hymenoptera* in this country proves that nothing but an intimate acquaintance, with variable insects, can enable the naturalist to distinguish between the variety and the species.

In support of the above opinion, it is only necessary here to quote a single instance; namely, the *Bombus subter-*

*raneus*, which in its most highly coloured form is a black insect, with bright yellow bands on the thorax and abdomen, having the apex of the latter white; from this form, every gradual change is to be met with, until we arrive at the last, which presents an insect totally black: no one, possessing the extremes of the range of varieties only, and only one or two of the intermediate stages, could possibly satisfy himself that these constituted but one species; supply the intermediate links, and the difficulty ceases at once. Such being the case in one instance, we may reasonably conclude that it is a circumstance of frequent occurrence; such in fact it is well known to be amongst British insects.

The above observations tend principally to establish the fact, that great range must be allowed to differences in coloration, whilst endeavouring to settle its limits, when describing a species. We will now advance a well-known insect, as an instance of differences to be met with in a single species, in sculpture and form. No better illustration of this can probably be produced than *Chrysis ignita*. This insect is entirely covered with punctures; but the differences in the coarseness or fineness of the punctation is immense. The apex of the abdomen is armed with four teeth; but the relative length as well as position of these is known to assume nine distinct types of form; in the last, the two central teeth are nearly obsolete; in a tenth type, which we possess, all the teeth are obsolete. The above instances should, we think, induce the young naturalist to resist the spreading rage for the multiplication of species, and to avail himself of every information which either collections or books afford, before he venture to create a species, probably out of a variety, or to do that which another has accomplished before him. The attention which is now being given to this subject will doubtless create a re-action, and we may even

observe a tendency on the part of some to allow little less than the contents of most of our modern genera to rank as a *species;* the order itself, consequently, falling into what we now consider to constitute a *genus.*

It was our province last year to record an unusual scarcity of the aculeate tribe; the season of 1856 produced them in tolerable abundance generally; but it is a remarkable fact, that the *Vespidæ,* which were scarce in 1855, have been still more so in 1856. Indeed persons, not Entomologists, in certain districts have remarked their scarcity. We have observed, that, in seasons when fruit is abundant, wasps are abundant also. This is what might indeed be expected. The same warm genial weather which causes your fruit trees to blossom, rouses the wasps from their winter's torpidity. When this is followed by severe, cold and wet weather, with sharp frosty nights, the blossoms are nipt and the fruit crop destroyed. The same causes prove destructive to the *Vespidæ.* In limited districts I have been told that wasps have been plentiful, but, generally, I have ascertained, they have been unusually scarce.

Bees, on the contrary, have been abundant; and in the Isle of Wight, which I believe "to surpass all other localities in this country for its richness in Hymenopterous treasures," their abundance was such, that in one spot at Freshwater, Mr. Bond informed me, that he had no doubt he could have captured upwards of a hundred specimens of a species of *Halictus,* by one swoop of his net. In the month of April, we observed a greater number of *Andrena Clarkella* on Hampstead Heath than we ever remember to have observed on any previous occasion; it would appear indeed to have been unusually abundant in many other situations, as several correspondents forwarded the species to us from different parts of the country.

I have this year obtained *Monodontomerus nitida* from the cells of *Osmia bicornis;* upon the larva of the latter insect it is parasitic; as many as eight or ten of the Chalcididous parasite are nourished by a single larva of the bee. Another and more interesting insect, of the same family, was bred from the cells of the bee, namely, *Melittobia Acasta.* After the most careful comparison and examination of this insect, I believe it to be identical with the *Anthophorabia retusa* of Newport. I had not the opportunity of observing the parasites in their early stages of larva and pupa, as they were enclosed in the cocoons spun by the larvæ of the bee, so that I am unable to state confidently, whether both these parasites feed upon the bee larvæ or not. When I first met with the larvæ of *Melittobia* in 1843, in the cells of *Anthophora,* they were feeding upon the larvæ of *Monodontomerus.* This was easily observed, as the species of *Anthophora* do not spin cocoons, but undergo their changes in the clay cells constructed by bees.

I captured about a dozen specimens of *Exetastes femorator,* a species first described by Mr. Desvignes in his Catalogue of British *Ichneumonidæ,* recently published by the Trustees of the British Museum. This insect has not been met with in any other locality than the Deal Sands, where I found it. Its mode of running and flying so closely resembles a *Pompilus,* that at first sight I mistook it for one.

*Sphinctus serotinus,* only a few specimens of which have occurred in this country, was captured by Mr. Thomas Ingall on the 13th of September last; it was beaten out of an oak in the Wickham Woods; it appeared very sluggish and made no attempt to escape. Although diligent search was made a second example could not be found. We are indebted

to Mr. Ingall for kindly communicating the above information. Mr. Desvignes, we understand, has captured several rare species of *Ichneumonidæ*, but we have not been favoured with their names.

A winged female of *Ponera contracta* was captured by Mr. Baly of Kentish Town, whilst reading by an open window in his house; the *Ponera* flew into the room and settled on the page of his book. This insect is extremely rare in this country; so much so, that, although I have searched diligently for insects of the family to which it belongs for many years, I never met with a single individual. Mr. Westwood has also captured a female of *Ponera*, attracted to pieces of meat laid in his garden as baits for insects.

## Fossores.

*Tachytes unicolor* was captured in July on the sands near Deal; the only other localities for it known, are Luccombe Chine, Isle of Wight; Weybridge; and Sandhurst, near the Military College.

*Miscophus spurius?* Dahlb. This is one of the most interesting discoveries which I have had the good fortune to make. The genus *Miscophus* hitherto contained only a single British species, and has always been accounted one of extreme rarity; Mr. Westwood first discovered it in this country at Coomb Wood, and subsequently both sexes were taken by myself at Weybridge. In July last I met with the second species at Deal on the sand-hills. Like its congener it is only to be found on the hottest summer days; when cloudy or windy they disappear. *Miscophus spurius* differs from *M. bicolor* in both sexes being entirely black; the metathorax is proportionably longer and has a central longitudinal carina; it is also a larger species. Dahlbom says, that

*M. spurius* is rather smaller, which alone induces me to add a note of doubt to my insect; but as it possesses, in common with *M. spurius*, a central longitudinal carina on the dorsal surface of the metathorax, I am unwilling to consider a little difference in size as of much specific value.

*Astata stigma.* The female occurred at Deal in the month of July; last year I captured one in September; the male has not yet been taken in this country. I had the pleasure of adding the species to our fauna in 1836, by capturing a single female; it was not again met with until last year, when I took a second example, and my capture of 1856 makes the third: these are all which have occurred in this country to my knowledge.

*Oxybelus mucronatus.* This insect was described by Mr. Curtis as a new species, which he named *O. argentatus;* it has been frequently taken at Bideford, Devon, and I believe it has occurred near Liverpool; this season I took it on the Deal sand-hills.

The scarce *Mellinus sabulosus* has been taken at Nottingham by Mr. C. F. Allen of that place.

### Apidæ.

*Colletes marginata.* This hitherto extremely rare species occurs in July at Deal; it was first taken in this country by Dr. Leach, and Mr. Samuel Stevens next took it at Little Hampton, Sussex; at Deal it is not uncommon, but confined to one particular locality; I did not observe a single example in any other situation.

*Andrena decorata.* The rare species has been taken by Mr. Parfitt in the neighbourhood of Exeter.

*Cilissa tricincta.* This very local species I found not uncommon at and in the neighbourhood of Deal: nearly all

which I captured were males; the female I have very rarely taken.

*Megachile maritima* is an abundant insect on the sand-hills at Deal during July; there it burrows in the ground, which proves it to be an insect of varied habit. I have observed it burrowing in decayed wood in Hampshire; but in the Isle of Wight it burrows in the cliffs of Sandown Bay in multitudes; at Deal, as in Sandown Bay, it is accompanied by its parasite *Cœlioxys Vectis.*

*Megachile argentata.* This is the *M. Leachella* of Stephens and of all our cabinets a few years ago, an insect then considered a great rarity; in 1844 I met with one or two at Weybridge, and four years ago I again took two or three at Southend. The metropolis of this species is on the sand-hills at Deal; in the month of July they are to be found settling on every hillock, the place is literally alive with them, their cheerful piping sound is heard everywhere; the male is usually found chasing the female from flower to flower; sometimes they are pursued by two or more males at once whilst settling on the trefoil. This insect burrows in the ground, and lines its tunnel with the leaves and petals of *Lotus corniculatus;* the latter appear to be most frequently selected for the inner lining of the cells, and are also used together with cuttings of leaves in forming the divisions between the cells. The industrious little creature having lined its burrow as described, deposits a sufficient quantity of semi-fluid pollen and honey for a single larva, and then closes in that portion of the tube with circular pieces of leaf, thus forming the first cell; the process is repeated until five or six cells are furnished, when her task is completed. There can be little doubt of the same bee constructing several burrows of this kind.

*Cœlioxys 4-dentata.* This bee is the parasite of *M. argentata;* but is not so numerous, as I should have expected to have found it. By very assiduous search, I captured about twenty specimens. It is worthy of remark that in the Isle of Wight, where I found *Megachile maritima* abundant, its parasite *Cœlioxys Vectis* was very numerous, as were also *Saropoda bimaculata,* and its parasite *Cœlioxys umbrina;* but at Deal, although *Megachile maritima* and *argentata* were both abundant, their parasites *Cœlioxys Vectis* and *4-dentata* were scarce.

*Dasypoda hirtipes.* We notice the capture of this beautiful insect, by Mr. Dossetor at Redhill near Reigate, and by myself at Deal, principally for the purpose of recording a new phase in bee history. Entomologists are well acquainted with the fact of immense numbers of Lepidopterous and also Coleopterous insects flying by night; and thirteen years ago I recorded the fact of *Vespa crabro* carrying on its labours by moonlight. Until the present season I was not aware that any species of *Apidæ* took flight after dark; but one moonlight night, walking in the streets of Deal, I captured males of *Dasypoda hirtipes* on the wing; several large insects had flown about our faces, but were supposed to be moths, until one got entangled in my wife's head-dress, and on releasing it, it proved to be *Dasypoda.* I should observe, that the situation of the colonies of this bee are upwards of a mile from the spot where we captured them at night.

*Stelis aterrima* and *phœoptera* have both occurred this season; the first at Deal, and the latter near Exeter, where it was captured by Mr. W. H. Parfitt, who observed it about the burrows of *Osmia ænea.*

*Nomada borealis.* Both sexes of this species were captured by Mr. Dossetor and myself on Hampstead

Heath at the end of April. Mr. Bold also found it plentifully near Newcastle.

*Apathus rupestris.* I captured about twenty specimens of the female of this bee on the heads of thistles, at Sandwich in Kent. Twenty years ago I met with a similar number in a gravel-pit at the top of Coomb Wood; these are unusual occurrences, the insect being rather scarce, at least the female, and only captured at intervals.

It may appear to some that in the above summary we have done little more than chronicle our own doings. To this we answer, the fault lies not at our door; we shall be ready to hail joyfully any number of companions in the selfsame fruitful field, which only needs to be toiled in with industry, and every one may ensure to himself a most abundant harvest of never-failing enjoyment.

# NEUROPTERA.

## A Synopsis of the British Dragon-Flies.

By Dr. Hagen.

The object of this paper is to enable the inexperienced collector of Dragon-flies to name readily any species he may meet with in this country; the special characters which distinguish the species and genera are therefore put prominently forward; and in the characters of the genera and groups, those are made use of which apply to all the British species, even though, in *other parts of the globe*, species may occur to which the characters here laid down will not rigorously apply.

The British Dragon-flies are 46 in number; besides enumerating these, the characters of several other species *not unlikely to occur* in Britain are given, in order to facilitate the naming of *new* British species by those who are so fortunate as to meet with them. These probable British species have no numeral prefixed to their names, which are printed in *Italics*, not in Capitals.

First tribe. Wings not similar; the posterior dilated at the base.

First division. Lower lip smaller than the palpi.

First sub-family. Eyes simple, not prolonged posteriorly: Libellulina.

Genus Libellula, Linné.

A. With 10—16 antecubital nervures; large species; abdomen broad and depressed.

†. 4 rows of post-trigonal cells.

1. L. quadrimaculata, L.; Steph.; Revue, p. 7. Ev. pl. 17, fig. 1, 2.

Length 19 lin.; exp. 32 lin.

Habitat England, Scotland, Ireland generally.

Olivaceous, villous; sides of the thorax yellowish, streaked with black; abdomen rather conical, black towards the tip; wings yellowish at the base; the pterostigma, *a spot in the middle of the costal margin* of the anterior, and a triangular spot at the base of the posterior, black.

Var. Tip of the wings brown. *L. prænubila* Newman.

††. Three rows of post-trigonal cells.

a. A blackish triangular spot at the base of the posterior wings.

2. L. depressa, L.; Steph.; Revue, p. 8. Ev. pl. 16, figs. 1, 2.

Length 19 lin.; exp. 32 lin.

Habitat England, Scotland, Ireland; generally.

Olivaceous, villous; *abdomen very broad and much*

*depressed*, with yellow spots on the sides; powdered with blue in the adult ♂; anterior wings with a longitudinal rusty blackish band at the base; posterior wings with a triangular spot of the same colour; *accessory membrane white*.

3. L. FULVA, Müller; Revue, p. 9. *L. conspurcata*, F.; Steph. Ev. pl. 16, fig. 3.
Length 19 lin.; exp. 32 lin.
Habitat England; local.
Dusky reddish, villous; abdomen with an apical black-band; powdered with blue in the adult ♂; anterior wings with a rusty black line at the base; posterior wings with a line and triangular spot of the same colour; *accessory membrane blackish*.
Var. The tips of the wings brown.

b. POSTERIOR WINGS WITHOUT A BLACKISH SPOT AT THE BASE.

4. L. CANCELLATA, L.; Revue, p. 12; Steph. Evans, pl. 17, fig. 3, and pl. 18, fig. 1.
Length 19 lin.; exp. 32 lin.
Habitat England; local.
Yellowish; *abdomen with two black bands*; powdered with blue in the adult ♂; wings hyaline; pterostigma and *accessory membrane blackish*.

*L. albistyla*, Selys; Revue, p. 13; closely resembles the preceding, differing chiefly by the *whitish anal appendages*; (these are black in *L. cancellata*). It occurs at Lyons.

5. L. CÆRULESCENS, F.; Revue, p. 22; Steph. Ev. pl. 18, fig. 2, 3.

Length 16 lin.; exp. 26 lin.

Habitat England, Scotland, Ireland; local.

Olivaceous; abdomen little depressed, rather carinated; powdered with blue in the adult ♂; wings hyaline; pterostigma yellow; *accessory membrane whitish.*

*L. brunnea*, Fonscol.; Revue, p. 18.

Length 19 lin.; exp. 32 lin.

Very similar to the last, a little larger; the adult ♂ entirely powdered with blue, *the genital organs little protruded;* (tolerably prominent in *L. cærulescens*); ♀ with the vulvar scale broadly emarginate, the corners rounded; (in *L. cærulescens* abruptly emarginate, with the corners swollen).

Common in Belgium.

*L. erythræa*, Brullé; Revue, p. 24.

Length 17 lin.; exp. 27 lin.

Olivaceous; the adult ♂ *bright red;* wings hyaline, slightly tinged with saffron at the base; pterostigma yellow; *accessory membrane blackish.*

Near Paris, and in Anjou.

B. WITH 6—8 ANTECUBITAL NERVURES; SMALL SPECIES; ABDOMEN SLENDER, NEARLY CYLINDRICAL.

*L. pedemontana*, F.; Revue, p. 28.

Length 14 lin.; exp. 22 lin.

Small; reddish or olivaceous; wings hyaline, *with a broad brown* transverse band towards the tip; pterostigma yellowish.

In Belgium.

*a.* POSTERIOR WINGS WITHOUT A TRIANGULAR BLACKISH SPOT AT THE BASE.

†. LEGS BLACK, EXTERNALLY YELLOW; ABDOMEN REDDISH-OLIVE IN THE ADULT ♂.

6. L. FLAVEOLA, L.; Revue, p. 33; Steph. Charp. pl. 9.
Length 16 lin.; exp. 26 lin.
Habitat England, Scotland; local.
Yellowish, the base of the wings (*the posterior pair to a third or more*) *tinged with saffron;* pterostigma short, yellow; anal appendages of the ♂ straight; *nervures of the wings blackish.*

7. L. FONSCOLOMBIS, Selys; Revue, p. 37.
Length 17 lin.; exp. 28 lin.
Habitat near London (a single ♀ in the collection of the British Museum, formerly in that of Mr. Stephens).
Yellowish or reddish; base of the wings tinged with saffron; *pterostigma large, yellow;* posterior tibiæ of the ♂ black externally; *upper anal appendages* of the ♂ *slightly geniculated; most of the nervures reddish.*

8. L. MERIDIONALIS, Selys; Revue, p. 39.
Length 16 lin.; exp. 26 lin.
Habitat near London; two ♀ in the collections of Evans and Wailes.
Yellowish, *sides of the thorax immaculate;* wings hyaline, almost uncoloured at the base; pterostigma narrow, yellow; *vulvar scale* of the ♀ *not projecting,* rounded.

9. L. STRIOLATA, Charp.; Revue, p. 40. *L. vulgata,* Steph.; Ev. Charp. pl. 10.
Length 17 lin.; exp. 28 lin.
Habitat England, Scotland, Ireland.
Olivaceous, sides of the thorax with three oblique black streaks; the incisures of the abdominal segments, and

two very small dots towards the hinder edge, yellow; wings hyaline, almost uncoloured at the base; pterostigma reddish; *vulvar scale* of the ♀ *projecting*, broad, *emarginate at the end.*

10. L. VULGATA, L.; Revue, p. 45. Charp. pl. 11.
Length 17 lin.; exp. 28 lin.
Habitat. A ♀ taken near Hull; on the authority of Mr. Dale.
Olivaceous, sides of the thorax with three oblique black streaks; abdomen without yellow dots; wings hyaline, almost uncoloured at the base; pterostigma reddish; *vulvar scale* of the ♀ *very prominent, not emarginate at the end; straightened.*

††. LEGS BLACK.

11. L. SANGUINEA, Müller; Revue, p. 31. *L. Roeselii*, Curt. *L. rufostigma, basalis, angustipennis*, Steph. Charp. pl. 10, *L. nigripes.*
Length 16 lin.; exp. 26 lin.
Habitat England, local.
Olivaceous or reddish; underside of the thorax behind the legs of the ground colour; *abdomen with a lateral black band;* base of the wings tinged with saffron; pterostigma reddish; in the adult ♂ the abdomen is reddish.

12. L. SCOTICA, Donov.; Revue, p. 48; Steph.; Curtis. Charp. pl. 12.
Length 14 lin.; exp. 23 lin.
Habitat England, Scotland, Ireland.
Olivaceous or blackish; underside of the thorax behind the legs with *three yellow spots forming a fleur-de-lys;* abdomen short, black, spotted with yellow; wings of the ♂ hyaline; in the ♀ a little tinged with

saffron at the base; pterostigma square, and black. The adult ♂ almost entirely black.

*b.* POSTERIOR WINGS WITH A BLACKISH TRIANGULAR SPOT AT THE BASE.

FRONT WHITE, LOWER LIP BLACK, UPPER LIP OF THE MALE WHITE, OF THE FEMALE BLACK; ABDOMEN SHORT, WITH ANGULAR SPOTS ABOVE; PTEROSTIGMA SQUARE.

†. ANAL APPENDAGES BLACK.

13. L. DUBIA, Vander Lind.; Revue, p. 50. *L. rubicunda*, Curt. pl. 712.

Length 15 lin.; exp. 26 lin.

Habitat England, rare; near Dorchester.

Black, spotted with orange, villous; *abdomen slender*, spotted above as far as the seventh segment; wings hyaline, a dot and a basal spot (larger on the posterior wings) blackish; *pterostigma reddish; vulvar* scale with two little *valves*, which are *quadrangular and contiguous.*

*L. rubicunda*, L.; Revue, p. 53. Charp. pl. 13, *L. pectoralis*, var.

Length 18 lin.; exp. 28 lin.

Black, spotted with red or orange, villous; *abdomen slender*, spotted above as far as the seventh segment; wings hyaline, a spot on the anterior, a dot and a spot on the posterior blackish; the *pterostigma reddish*, ♂; or *black*, ♀; *vulvar* scale with two very small triangular *valves, very remote from one another.*

In Belgium.

*L. pectoralis*, Charp. pl. 13; Revue, p. 56.

Length 18 lin.; exp. 28 lin.

Black, spotted with red, or orange, villous; *abdomen*

*thick*, spotted above as far as the seventh segment; wings hyaline, the base a little yellowish, the posterior with a triangular black spot; *pterostigma black*; *vulvar* scale prolonged into two long triangular *ligulæ*, which are *contiguous* except at the end.

In Belgium.

### †† Upper anal appendages whitish.

*L. albifrons*, Burm.; Revue, p. 59.

Length 16 lin.; exp. 26 lin.

Black, spotted with orange, villous; abdomen *slender*, *cylindrical*, spotted above as far as the sixth segment; powdery blue in the adult male; wings hyaline, posterior with a triangular black spot; *pterostigma black*; *vulvar scale* with two *broad*, *contiguous lamellæ*, *very short*.

In Sweden, Prussia and Austria.

*L. caudalis*, Charp. pl. 44; Revue, p. 62.

Length 16 lin.; exp. 28 lin.

Black, spotted with orange, villous; *abdomen much dilated at the tip*, depressed, spotted above as far as the sixth segment; wings hyaline, the base tinged with saffron, the posterior with a triangular black spot; *pterostigma black*; *white above in the male*, of which the abdomen is powdery blue; *vulvar* scale prolonged into two long *ligulæ*, *contiguous* except at the end.

In Belgium; and in France, near Paris.

SECOND SUB-FAMILY. THE EYES WITH A SLIGHT PROLONGATION BACKWARDS. CORDULINA.

A. A TRIANGULAR BLACKISH SPOT AT THE BASE OF THE POSTERIOR WINGS.

Genus EPITHECA, Charp.

*E. bimaculata*, Charp. pl. 1 ; Revue, p. 66.

Length 26 lin. ; exp. 38 lin.

Large ; testaceous, villous ; *abdomen long, depressed in the middle*, with a dorsal black band ; wings yellowish, tinged with saffron on the costal margin ; *accessory membrane very large, whitish.*

In Belgium.

B. POSTERIOR WINGS WITHOUT A BLACKISH SPOT AT THE BASE.

Genus CORDULIA, Leach.

a. TRIANGLE OF THE ANTERIOR WINGS INÆQUILATERAL, INCLOSING A TRANSVERSE NERVURE.

†. FACE SPOTTED WITH YELLOW, LOWER ANAL APPENDAGES OF THE MALE TRIANGULAR.

14 ? C. METALLICA, Vander Lind. ; Steph. ; Revue, p. 62. Charp. pl. 15.

Length 23 lin. ; exp. 32 lin.

Habitat. No specimen is known with certainty to have been caught in England. Harris's figure is very doubtful.

Bronzed-green ; *a transverse yellow band on the front ;* anal appendages of the male bent inwards at an angle near the end, smooth beneath ; *vulvar scale very long, subulate, straightened.*

*C. alpestris*, Selys; Revue, p. 71.
Length 20 lin.; exp. 28 lin.
Very similar to the preceding, but a little smaller; a yellow spot before each eye, instead of the band; *the vulvar scale short, rounded.*
In Sweden and Switzerland.

15. C. ARCTICA, Zetterstedt; Revue, p. 71.
Length 21 lin.; exp. 30 lin.
Habitat Perthshire, in July.
Bronzed-green; a yellow spot before each eye; *anal appendages* of the male closely approximated, with three teeth beneath, *semicircular at the extremity;* vulvar scale short, triangular, pointed at the end.

*C. flavo-maculata*, Vander Lind.; Revue, p. 73. Charp. pl. 16.
Length 23 lin.; exp. 32 lin.
Similar to the preceding, but a little larger; abdomen stouter, spotted with yellow at the sides; *anal appendages* of the male with the ends *approximating; vulvar scale bifid at the tip.*
In Belgium.

††. FACE NOT SPOTTED WITH YELLOW, LOWER ANAL APPENDAGES OF THE MALE FORKED.

16. C. ÆNEA, L.; Donov.; Steph.; Revue, p. 75. Charp. pl. 14.
Length 20 lin.; exp. 30 lin.
Habitat England, local; Ireland (?)
Bronzed-green, upper anal appendages of the male subcylindrical, the point turned outwards; vulvar scale strongly bifid.

b. TRIANGLE OF THE ANTERIOR WINGS EQUILATERAL, WITHOUT AN INCLUDED NERVURE.

17. C. CURTISII, Dale; Steph.; Curtis, pl. 616; Revue, p. 77.
Length 20 lin.; exp. 30 lin.
Habitat England, local; (New Forest).
Bronzed-green, face of the ground colour; *abdomen* cylindrical (♂) or compressed (♀), *with dorsal yellow spots;* anal appendages of the male sub-cylindric, with an internal spine at the base, the lower a little emarginate at the end; vulvar scale short and rounded.

## SECOND DIVISION. LOWER LIP LARGER THAN THE PALPI.

### THIRD SUB-FAMILY. EYES NOT CONTIGUOUS, OR SCARCELY SO. GOMPHINA.

#### A. EYES REMOTE, LOWER LIP ROUNDED AT THE TIP.

#### Genus GOMPHUS, Leach.

18. G. VULGATISSIMUS, L.; Revue, p. 82; Steph.; Curtis. Evans, pl. 14, f. 1.
Length 22 lin.; exp. 28 lin.
Habitat England; local. Ireland.
Thorax yellow, with six straight broad black stripes; *abdomen* black, *with a* dorsal *yellow stripe, not extending beyond the seventh segment;* costal nervure black outwardly; legs black; anal appendages of the male cylindrical, suddenly pointed, the lower with the branches wide apart; vulvar scale cleft in the apical half.

19. G. FLAVIPES, Charp.; Steph., pl. 30; Revue, p. 84.
Length 24 lin.; exp. 33 lin.
Habitat England (Hastings in August). A single

male in the collection of the British Museum, formerly in that of Mr. Stephens.

Thorax yellow, with six curved stripes; abdomen black, with a dorsal yellow stripe continued to the end; costal nervure black outwardly; *legs yellow, streaked with black;* anal appendages of the male cylindrical, pointed, the lower with widely separated branches; vulvar scale short, divided to the base.

*G. pulchellus*, Selys; Revue, p. 91; Charp. pl. 30 (*anguina*).

Length 22 lin.; exp. 27 lin.

Thorax yellow, with six narrow straight black streaks; abdomen black, with a dorsal yellow stripe continued to the end; *costal nervure yellow outwardly;* legs yellow, streaked with black; anal appendages of the male cylindrical, truncate externally at the end, the lower with the branches widely separated, vulvar scale broadly emarginate in its apical half.

In Belgium.

20. G. FORCIPATUS, Revue, p. 98; Charp. pl. 27.

Length 23 lin.; exp. 28 lin.

Habitat England. One female in the collection of the British Museum, formerly in that of Mr. Stephens.

Thorax yellow, with six curved black streaks; abdomen black, with lanceolate dorsal yellow spots; legs black, yellow at the base; *anal appendages* of the male *hooked, the point bifid,* the lower with the branches contiguous; vulvar scale prolonged in two approximating lamellæ.

B. EYES SLIGHTLY CONTIGUOUS, LOWER LIP CLEFT AT THE END.

Genus CORDULEGASTER, Leach.

21. C. ANNULATUS, Latr.; Steph.; Evans, pl. 13; Revue, p. 104.
Length 32 lin.; exp. 42 lin.
Habitat England, Scotland, Ireland.
Large, black; thorax with eight yellow stripes; abdomen with the median segments yellow; *back of the head yellow;* costal nervure yellow outwardly; upper lip yellow.

*C. bidentatus*, Selys; Revue, p. 107.
Length 30 lin.; exp. 40 lin.
Very similar; *back of the head and costal nervure black;* upper lip yellow, edged with black.
In Belgium.

FOURTH SUB-FAMILY. EYES COMPLETELY CONTIGUOUS.

ÆSCHNINA.

A. ANAL ANGLE OF THE POSTERIOR WINGS ACUTE (♂) OR ROUNDED (♀).

Genus ÆSCHNIA, Fabr.

22. Æ. PRATENSIS, Müller (*vernalis* auctorum); Revue, p. 113. Charp. pl. 21.
Length 26 lin.; exp. 34 lin.
Habitat England, Scotland, Ireland.
Brown, *very hairy;* thorax with two yellow bands in front; abdomen almost cylindrical, attenuated towards the end, spotted with blue (♂) or yellow (♀); anal appendages of male long, triangular, with the end obtuse, the lower very short, truncate, emarginate, triangular; *pterostigma long, very narrow;* accessory membrane small; anal angle of the posterior wings but slightly angular in the male.

23. Æ. MIXTA, Latr.; Revue, p. 122. Charp. pl. 19.
Length 28 lin.; exp. 36 lin.
Habitat England, Scotland; local.
Brown; *thorax with* two dots in front and *two bands on the sides, yellowish;* abdomen slender, cylindrical, coarctate behind the base in the male, spotted with blue (♂) or yellowish (♀); accessory membrane cinereous, lighter at the base; anal appendages of the male long, leaf-like, their end pointed, without a basal tubercle beneath; the lower long and triangular.

*Æ. affinis,* Vander Lind. (non Stephens); Revue, p. 124. Charp. pl. 18.
Length 28 lin.; exp. 36 lin.
Brown; *thorax* with two yellow dots in front, *the sides yellowish, with three black lines,* the middle one the shortest; abdomen slender, cylindrical, coarctate behind the base in the male, spotted with blue (♂) or yellowish (♀); accessory membrane cinereous, paler at the base; anal appendages of the male long, leaf-like, their end pointed, *a very distinct basal tubercle beneath;* the lower long, slender, triangular.
In Belgium.

24. Æ. BOREALIS, Zetterstedt; Revue, p. 119.
Length 26 lin.; exp. 34 lin.
Habitat Scotland. A single male in the cabinet of M. De Selys.
Brown; *thorax with* two small blueish lines in front, and *two narrow blueish bands at the sides;* abdomen slender, cylindrical, coarctate behind the base in the male, spotted with blue (♂) or yellowish (♀), accessory *membrane of a uniform cinereous;* anal appendages of the male long, leaf-like, their end pointed, an

inconspicuous basal tubercle beneath; the lower broad, triangular. *Æ. borealis* is easily recognized because it is the only one of which the *subnodal sector is simple*, and not bifurcate at the end; the subnodal sector is the fifth longitudinal nervure from the costa, counting that as one, in the end of the wing.

25. Æ. JUNCEA, L.; Steph.; Revue, p. 116. Charp. pl. 20. (*Æ. picta.*)
Length 32 lin.; exp. 46 lin.
Habitat England, Scotland, Ireland.
Brown; thorax *with two straight yellowish stripes in front*, interrupted in the female, and *two oblique yellowish bands at the sides;* abdomen slender, cylindrical, coarctate behind the base in the male, spotted with blue (♂) or yellowish-white (♀); accessory membrane cinereous, paler at the base; pterostigma very large; anal appendages of the male long, leaf-like, their end pointed, without a basal tubercle; the lower triangular, long.

26. Æ. CYANEA, Müller; (*maculatissima* auctorum); Revue, p. 115. Charp., pl. 23.
Length 32 lin.; exp. 46 lin.
Habitat England, Scotland, generally.
Brown; *thorax with two large oval green* spots in front, and two black lines on the sides; abdomen slender, cylindrical, coarctate behind the base in the male, spotted with blue (♂) or yellow (♀); accessory membrane short, whitish; pterostigma short, almost square; anal appendages of the male long, leaf-like, the end turned inwards; the lower short, obtuse, triangular.

27. Æ. GRANDIS, L.; Revue, p. 131. Charp., pl. 24.
Length 32 lin.; exp. 44 lin.
Habitat England, Scotland, Ireland, generally.
Reddish; thorax with two yellow bands at the sides, immaculate in front; abdomen cylindrical, coarctate behind the base in the male, slightly spotted with blue; *wings* of a *reddish yellow;* pterostigma more rufescent; anal appendages of the male long, leaf-like, their end obtuse; accessory *membrane* yellowish *white.*

28. Æ. RUFESCENS, Vander Lind.; Steph.; Revue, p. 129. Charp. pl. 25.
Length 30 lin.; exp. 40 lin.
Habitat England, local in the South.
Reddish, thorax with two yellow bands at the sides, immaculate in front; *abdomen* cylindrical, coarctate behind the base in the male; *a* triangular *basal yellow spot* above, *the rest* of the ground colour, *unspotted;* wings hyaline, the base a little reddish; pterostigma fulvous; accessory *membrane* large, *brown;* anal appendages of the male long, leaf-like, the end obtuse; a basal tubercle beneath.

B. ANAL ANGLE OF THE POSTERIOR WINGS ROUNDED IN BOTH SEXES.

Genus ANAX, Leach.

29. A. FORMOSUS, Vander Lind.; Steph.; Revue, p. 110. Charp. pl. 18.
Length 34 lin.; exp. 46 lin.
Habitat England, local in the South.
Large; *thorax green;* abdomen broad, depressed, blue with a dorsal black band; front with a black spot encircled with blue; wings broad, pterostigma small;

anal appendages of the male rather spatulate, the point truncate; the lower oblong-quadrate.

*A. Parthenope*, Selys; Revue, p. 111.

Length 30 lin.; exp. 42 lin.

Similar to the preceding, the *thorax reddish olive;* the anal appendages of the male externally with a spinous point; the lower square, short, broader than long.

In France, near Paris.

## Second tribe. Fore and hind wings similar.

## First division. Antecubital nervures numerous.

### Fifth sub-family. Large species.

### CALOPTERYGINA.

#### Genus Calopteryx, Leach.

30. C. Virgo, L.; Steph.; Revue, p. 134. Charp. pl. 31. *C. xanthostoma, anceps*, Steph. *C. hæmorrhoidalis*, Evans.

Length 17 lin.; exp. 21 lin.

Habitat England, Scotland, Ireland.

Metallic blue; *wings* broad, deep *blue, the base coloured; network very fine* (♂); green or metallic brown; *wings brown; pterostigma* white, *rather distant from the apex.*

31. C. splendens, Harris; Revue, p. 139. *C. Parthenias*, Charp. pl. 33.

Length 17 lin.; exp. 21 lin.

Habitat England, Scotland, Ireland.

Metallic blue; *wings* narrower, deep *blue, the base and tip hyaline, network more open,* ♂; metallic green; *wings hyaline; pterostigma* white, *apical.*

## Second division. Two antecubital nervures.

## Sixth sub-family. Small species. AGRIONINA.

### A. Tibiæ dilated.

### Genus Platycnemis, Charp.

32. P. pennipes, Pallas; (*platypoda*, Steph.; auctorum); Revue, p. 168. Charp. pl. 43.
Length 12 lin.; exp. 16 lin.
Habitat England, Scotland.
White or blue (♂) and green (♀); streaked with dull bronzed green: a band on the top of the head between the eyes, two anterior bands, and two lateral lines; abdomen with double black dorsal line, or two black dots at the hinder edge of each segment; *the four posterior tibiæ dilated*, whitish; pterostigma fulvous.

### B. Tibiæ cylindrical.

#### a. Pterostigma large, oblong.

### Genus Lestes, Leach.

#### †. Back of the head bronzed.

33. L. viridis, Vander Lind. (*not of English authors*); Revue, p. 148. Charp. pl. 35.
Length 15 lin.; exp. 18 lin.
Habitat England? (One in the collection of Mr. Evans).
Bronzed green, *long and slender;* thorax with three fine yellow lines in front; *pterostigma large*, light reddish; upper anal appendages like pincers, with a basal tooth, and a tubercle inside before the end; *the lower ones very short, conical, almost contiguous.*

34. L. NYMPHA, Selys, Revue, p. 151.
Length 12 lin.; exp. 14 lin.
Habitat England, Ireland.
Metallic green, powdered with blue (♂); stout, of variable size; pterostigma smaller, black; upper anal appendages like pincers, with two pointed teeth, internally rather far apart; *the lower ones long, dilated at the end.*

35. L. SPONSA, Hansem; Revue, p. 154. Charp. pl. 34.
Length 12 lin.; exp. 14 lin.
Metallic green, powdered with blue (♂), slender; pterostigma smaller, black; upper anal appendages like pincers, with two pointed teeth, internally approximated; *the lower ones long, not dilated at the end.*

†† BACK OF THE HEAD YELLOW.

36. L. VIRENS, Charp.; Revue, pl. 156. Charp. pl. 34.
Length 12 lin.; exp. 14 lin.
Habitat England; New Forest (two specimens in the collection of the British Museum, formerly in that of Mr. Stephens).
Metallic green, slender; *thorax beneath with three black spots on each side;* pterostigma reddish; upper anal appendages like pincers, with a little basal tooth, and a little median dilatation internally; the lower ones very short, converging at the end, which is rounded and very villous.

37. L. BARBARA, Fabr.; Revue, p. 159. Charp. pl. 35.
Length 12 lin.; exp. 17 lin.
Habitat Ireland? (one specimen in the Dublin Museum).
Metallic green, stout; thorax unspotted beneath; *pterostigma brown, external half yellow;* upper anal

appendages with a basal tooth, and a little median dilatation internally ; the lower ones a third shorter, conical, the end slender, villous.

*L. fusca*, Vander Lind. ; Revue, p. 161. Charp. pl. 36.
Length 12 lin. ; exp. 14 lin.
Brown, spotted with yellow ; wings narrow, pointed.
In Belgium.

b. PTEROSTIGMA SMALL, RHOMBOIDAL.

Genus AGRION, Fabr.

†. HEAD WITHOUT SPOTS BEHIND THE EYES.

38. A. NAJAS, Hansem ; Revue, p. 177. Charp. pl. 37.
Length 13 lin. ; exp. 18 lin.
Habitat England, Ireland (Haliday).
Blackish bronzed, yellow beneath, with the *abdomen blueish at the end* ( ♂ ) ; *thorax* immaculate ( ♂ ), or *with an interrupted yellow line* on each side ( ♀ ).

*A. viridulum*, Charp. ; Revue, p. 175.
Similar, but smaller, the *line of the thorax uninterrupted* in both sexes.
In Belgium.

39. A. MINIUM, Harris ; Revue, p. 178 ; Charp. pl. 36.
Length 13 lin. ; exp. 17 lin.
Habitat England, Scotland, Ireland.
Carmine-red ; *thorax* blackish bronzed, *with a lateral red or yellow stripe ; legs black ;* anal appendages of the ♂ long, equal ; *the lower ones bifid.*

40. A. TENELLUM, Villers ; Revue, p. 180.
Length 12 lin. ; exp. 14 lin.
Habitat England ; local in the south.
Red, *thorax immaculate, blackish bronzed ; legs reddish ;*

anal appendages of the male very short; the upper with a truncate tubercle; *the lower ones simple.*

†† HEAD WITH A ROUND SPOT ON EACH SIDE BEHIND THE EYES.

41. A. PUMILIO, Charp.; Revue, p. 182. Charp. pl. 39.
Length 10 lin.; exp. 12 lin.
Habitat England, Ireland.
Black; thorax with two blue bands in front; *hind lobe of the prothorax raised, rounded;* abdomen black, the ninth segment blue (♂), or bronzed (♀); *pterostigma of the anterior wings black internally* (♂).

42. A. ELEGANS, Vander Lind.; Revue, p. 188. Charp. pl. 38.
Length 12 lin.; exp. 14 lin.
Habitat England, Scotland, Ireland.
Black; thorax with two blue bands in front; *hind lobe of the prothorax, narrow, much raised;* abdomen black, *the eighth segment blue; pterostigma of the anterior wings black internally* (♂).
N.B. *A. pumilio* and *A. elegans* have each a variety of the ♀ of an orange colour, the thorax without anterior dark stripes.

43. A. PULCHELLUM, Vander Lind.; Revue, p. 197. Charp. pl. 40.
Length 12 lin.; exp. 14 lin.
Habitat England, Scotland, Ireland.
Bronzed, spotted with blue; hinder edge of the *prothorax* divided *into three lobes, the middle one the narrowest and longest; second segment* of the abdomen (♂) *with a furcate* bronzed *spot reaching to the hinder edge;* the abdomen of (♀) with two spots at the end of each segment.

44. A. PUELLA, L.; Revue, p. 200. Charp. pl. 41.
Length 12 lin.; exp. 16 lin.
Habitat England, Scotland, Ireland.
Blue, spotted with bronze (♂), or bronzed spotted with blue (♀); hinder edge of the *prothorax divided into three lobes, the middle one sinuated; second segment* of the abdomen (♂) *with a detached furcate* bronzed *spot;* abdomen of the ♀ with no spots posteriorly.

45. A. MERCURIALE, Charp.; Revue, p. 221. Charp. pl. 42.
Length 10 lin.; exp. 14 lin.
Habitat England (collections of Messrs. Dale and Curtis).
Bronzed, spotted with blue; hinder edge of the *prothorax rounded; second segment* of the abdomen (♂) *with a trifid spot reaching to the hinder edge;* tenth segment with a broad notch in both sexes.

46. A. CYATHIGERUM, Charp.; Revue, p. 205. Charp. pl. 42.
Length 12 lin.; exp. 16 lin.
Habitat England, Scotland, Ireland.
Blue, spotted with bronze; hinder edge of the *prothorax rounded; second segment* of the abdomen (♂) *with a heart-shaped spot reaching to the hinder edge;* the *eighth segment* (♀) *with a stout spine* on the under side.

*A. hastulatum*, Charp.; Revue, p. 209. Charp. pl. 41.
Length 12 lin.; exp. 16 lin.
Blue, spotted with bronze; hinder edge of the *prothorax forming in the middle an obtuse angle; second segment* of the abdomen (♂) *with a lanceolate spot reaching to the hinder edge, and two lateral lines;* no spine beneath the eighth segment of the ♀.
In Belgium.

# COLEOPTERA.

## Notes on British Geodephaga, with Descriptions of Four New Species (Supplementary to the Geodephaga Britannica).

By J. F. Dawson, LL.B.

Among the captures of the year 1856, that of *Lebia crux-minor* for the first time in *comparative numbers* in this country will be recognized as an important and interesting fact. I have also the pleasure of recording four additional species of British *Carabidæ*, which, though resting at present on a limited number of representatives, are all insects which we should naturally expect to find in England, being very well known in France, &c.

Two others have also been captured, but their claim to be admitted among our indigenous species must, to say the least, be looked upon at present with suspicion. *Chlænius Maillei* has already been exhibited at one of the meetings of the Entomological Society. It was captured near Gurnard's Bay in the Isle of Wight, but as it is a native of the Morea, and is not found in any country between that and England, had most probably (like many other species from various quarters of the world) been accidentally imported. Vessels coming up through the Needles must necessarily pass very near the shore, not far from which the specimen in question was found, as the channel in that part is very narrow. The fact of its having been taken from under moss (if that account

be literally correct) does not in my opinion lessen the suspicion that it came from some vessel passing up the channel, as any of the *Carabidæ* will naturally take refuge under the first convenient substance that affords them concealment.

The other species alluded to is *Agonum elongatum*, Dej., a ♀ example of which was captured as long ago as 1831, by the Rev. C. Kuper, on the banks of Wisbeach Canal near Lowestoff. This species is likewise a native of Greece, a country so dissimilar to England in climate and natural productions, that it seems scarcely probable that an insect which, like *Chlænius Maillei*, is also to be met with in none of the intermediate districts, should be more than an involuntary visitant. At all events we should be scarcely justified in admitting either into the British list, until its title shall have been confirmed by the discovery of additional examples.

*Lebia crux-minor*, Linn. S. N. ii. 673 (*Carabus*); Dawson, Geod. Brit. p. 17. More than fifty specimens were taken between the end of April and the end of June, 1856, under moss in a little swamp by the side of a wood near Hurstperpoint, Sussex; and others seen at sugar placed on trees to attract *Noctuæ*, chiefly on wet nights, near the same spot. The credit of the discovery of what may be considered an actual colony or metropolis of this rare species, of which merely a few chance specimens had previously occurred at distant intervals and in uncertain localities, is due to Mr. J. Hemmings of Brighton.

*Tarus axillaris*, Fab. Ent. S. i. 132 (*Carabus*); Dawson, Geod. Brit. p. 22. Not uncommon on the Downs near Lewes, beneath stones in spring and autumn.

*Polystichus fasciolatus*, Oliv. Ent. iii. 33; Dawson, Geod. Brit. p. 24. Captured by Mr. H. Adams on the 28th of July, crawling on the path-way near the Port Admiral's

house at Sheerness; and on the 18th of August by Mr. Unwin, beneath a heap of stones between Newhaven and Beachy Head.

*Carabus intricatus*, Linn. F. S. 780; Dawson, Geod. Brit. p. 34. A solitary example has been captured as late as September 9, 1856, in one of the woods near Plymouth: it will be remembered that the captures previously made by Mr. Hore were early in the spring—March or the beginning of April.

*Nebria complanata*, Linn. S. N. ii. 671 (*Carabus*); Dawson, Geod. Brit. p. 46. The claim of this insect to be included among the Irish species has rested upon a single half-dead individual found on the Arklow Sands. This was at any rate suspicious, and it is therefore satisfactory to be able to establish its undeniable title to be included among the indigenous species of Ireland. Towards the end of July, 1856, Mr. Percival Wright discovered it in abundance about two or three miles from Arklow, hiding among the *Asplenium marinum*, which grows there in profusion, and close to the ground in the clefts of the rocks.

*Panagæus 4-pustulatus*, Sturm, D. F. iii. 172; Dawson, Geod. Brit. p. 59. Three specimens were captured between the 9th and 24th of May by Mr. Reading on the sea coast at Whitsund Bay; they were running about on some sunny slopes, which are clothed with grass and moss, with occasional furze bushes interspersed.

*Licinus depressus*, Payk. Faun. i. 110 (*Carabus*); Dawson, Geod. Brit. p. 62. Not uncommon on the Downs near Lewes, under stones in spring and autumn.

*Anchomenus livens*, Gyll. Ins. Suec. ii. 149 (*Harpalus*); Dawson, Geod. Brit. p. 82. Woods near Lewes and Hurstperpoint, Sussex, at sugar placed on the trunks of trees to attract *Noctuæ;* and in Kent by brushing the hazel.

*Anchomenus Ericeti*, Panz., Faun. cviii. 6 (*Carabus*); Dej. Spec. *A. fulgens*, Dawson, Geod. Brit. p. 87.

The nomenclature of this species is to be corrected as above, and the entire paragraph at page 87 of *Geodephaga Britannica*, beginning "Dr. Schaum, in his remarks, &c.," must be erased. The supposed typical examples of *Ericeti*, Panz., which Mr. Wollaston brought from Dr. Heer, I found upon examination to be varieties of *A. 6-punctatus*. If these then were genuine representatives of *Ericeti*, it was clear that the latter insect could not = our *A. fulgens*, which is very different; but after all it turned out that they were *not*, but simply varieties of *A. 6-punctatus*, which I pronounced them to be at the time. Dr. Schaum has since lent Mr. Wollaston Panzer's own identical type of *Ericeti*. I have not seen it, but Mr. Wollaston assures me it is very different from the other *supposed* examples; and coincides exactly with our *A. fulgens*, as Dr. Schaum asserted. I, therefore, take this opportunity of correcting a statement, which could not have been made by me, had it not been unluckily based upon false premises.

*Anchomenus gracilis*, Sturm, D. F. v. 197 (*Agonum*); Dawson, Geod. Brit. p. 91. Specimens have been captured by Mr. Plant near Leicester.

*Amara infima*, Dufts., Faun. ii. 114 (*Carabus*). Head and thorax shining black; elytra coppery or purplish black; palpi and antennæ pitchy, the base of the former and two joints at the base of the latter clear red. Thorax broad and short, slightly emarginate in front, with its anterior angles obtuse, sides very gradually rounded, not much narrowed behind, posterior angles nearly right angles; disk with an entire distinct dorsal line, slightly depressed before and behind, having two deep foveæ on each side at the base, the inner one one terminating in an irregular striæ above, the

outer one round; both foveæ, as well as the space between them, distinctly punctulated. *Elytra* ovate, rather wider than the thorax, sides very slightly rounded, distinctly punctate-striated, the punctured striæ shallower and smoother as they approach the extremity; underside black, legs pitchy, femora darker, with the tip next the joint of the tibiæ clear red; length $2\frac{1}{4}$ lin.

This insect very nearly resembles *tibialis*, but is easily distinguished by its broader form, especially by the greater width of the thorax in front and the two deep punctulated foveæ on each side close to the base; the elytra also has a broader appearance and its sculpture is more marked.

I have the pleasure of adding this species to the British Fauna on the authority of four examples which were captured on the sand-hills at Deal, and which I detected among a few specimens of *A. tibialis;* the latter insect occurs there in profusion, and I doubt not that among a considerable number of them other examples of *infima* might be found. It is a south of France insect also, but I believe it is somewhat local.

*Amara rufocincta*, Sahlb., Ins. Fen. 249 (*Carabus*). Pitchy black, shining, sometimes brownish testaceous; the lateral margins of the thorax narrowly red, more distinctly so in paler individuals. *Head* smooth and convex, with an impression on each side before the eyes; antennæ and palpi testaceous red. *Thorax* very broad and ample, slightly narrowed in front, posterior angles right angles or slightly acute, disk convex, dorsal furrow deeply impressed in the centre, less so before and behind, base depressed throughout, having two connected foveæ on each side midway between the dorsal furrow and the posterior angles, the foveæ and the space about them coarsely punctured. *Elytra* oblong, broad but scarcely so wide as the thorax, sides almost straight till

shortly before the extremity, then gradually contracted, convex, deeply striated, the striæ punctured for two-thirds their extent and deepening towards the apex, the outer margin with a series of coarse impressions; under side black, legs red. Length $2\frac{1}{2}-3$ lin. This species has been captured near Reigate, and on the sand-hills at Deal.

*Amara brunnea*, Gyll., Ins. Suec. ii. 143 (*Harpalus*); Dawson. Geod. Brit. p. 126. Additional Irish localities; North Bull Sands, Dublin; Rossbegh, Kerry.

*Harpalus calceatus*, Dufts. Faun. ii. 81 (*Carabus*). Elongate, brownish or pitchy black; palpi and antennæ testaceous red. *Thorax* subquadrate, sides rounded in front, slightly narrowed behind, posterior angles right angles, disk transversely wrinkled, with a very distinct dorsal furrow, and the entire posterior margin and angles very densely punctulated, but without foveæ, having merely in their place indistinct or obsolete depressions. *Elytra* striated, striæ impunctate, interstices convex, outer margin finely and thickly punctulated in the middle, more coarsely before and behind; underside pitchy; breast punctured; legs testaceous red. Length $5\frac{1}{2}$ lines.

A single ♀ example was captured near Swansea, as long ago as 1830, by the Rev. C. Kuper. I am surprised that this species should not be common with us, and that its claim to be recorded should even now rest upon a solitary individual. It is plentiful in France, and occasionally enters lighted apartments in the summer evenings; moreover it is a large and conspicuous insect and very unlikely to be overlooked.

*Stenolophus Skrimshiranus*, Steph. Mand. i. 166; Dawson, Geod. Brit. p. 155. Locally abundant by the side of a ditch near the town of Lewes in April, 1856.

*Bembidium obliquum*, Sturm, D. F. vi. 160, p. 161; Dawson, Geod. Brit. p. 195, pl. 2, f. E. A third locality

for this species has been discovered by Mr. Hemmings in the neighbourhood of Brighton. It has therefore been found on the south coast, in a midland county, and (Mr. Bold's original example) in the North of England.

*Bembidium Clarkii*, Dawson, Ann. Nat. Hist. iii. 215 (1849 (*Lopha*)); Geod. Brit. p. 199. *Leja bisulcata*, Chaudoir, Bull. Mosc. t. 17, 2, p. 452 (1844). This is one of the few species hitherto supposed to occur only in England; but we are informed by M. Jacquelin Duval that it is identical with *Leja bisulcata*, Chaudoir, discovered in Southern Russia. This is interesting as affording an additional instance of the community of species between these two countries. It will be remembered that *Lymnæum nigropiceum* has been found only in the Isle of Wight and in Southern Russia. The present species, however, was captured for the first time last autumn in the neighbourhood of Paris. The above synonym must therefore be added: and, though it is of an earlier date than the name employed by myself, it can hardly be retained, having been previously applied to represent different species in the same genus.

*Bembidium Sturmii*, Panz. Faun. 89, 9 (*Carabus*). Head and thorax brassy black, very shining; the former with two deeply impressed oblique frontal furrows which approximate and unite in front in a point; eyes large and prominent, antennæ pitchy, their basal joint entirely and the next partially testaceous red. *Thorax* cordate, sides broadest and much rounded a little before the middle, narrowed behind, posterior angles acute, disk convex, having the usual dorsal furrow and anterior transverse impression, base with a deep punctuated fovea on each side, and otherwise rugged. *Elytra* oblong-ovate, broad, brassy brown, with the extreme tip, a roundish spot on each side near the outer margin before the tip, and several other angular and longitudinal marks on the

anterior portion, testaceous; convex, deeply punctate-striated, the innermost punctured striæ becoming fainter as they approach the extremity, and the outer ones nearly obsolete: underside black, legs testaceous red. Length 1 line.

Dr. Power has the credit of introducing this species into the British Fauna, having discovered a single example in the autumn of 1855, in Hammersmith marshes; and in July last I was agreeably surprised at recognizing a second specimen in the possession of a friend, who had captured it a few weeks previously on the bank of a pond, above fifty miles from the above locality, thereby proving that it is to be found in more than one district.

# COLEOPTERA.

## New British Species noticed in 1856.

By E. W. Janson.

1. Agabus pulchellus, Heer; E. Newman, Zool. 5003 (1856).

Captured by G. Wailes, Esq., in Loch Achray, on the north side of Loch Katrine in September, 1853.

2. Helophorus pumilio, Erich. (not Steph.); Rev. H. Clark, Zool. 3051 (1856).
3. Catops spadiceus, Sturm; Murray, Ann. and Mag. Nat. Hist. 2nd Ser. xviii. 21 (1856). Scotland.
4. Catops coracinus, Kellner; Murray, Ann. and Mag. Nat. Hist. 2nd Ser. xviii. 140 (1856.)

*Genus* ADELOPS, Tellkampf in Erichson's Archiv., 1844, i. 318. *Bathyscia*, Schiödte, Spec. Faun. Subterran. 10 (1849); Trans. Ent. Soc. Lond. n.s. i. 141 (1851.)

This genus, established on a single individual of *A. hirtus*, Tellk. *loc. cit.* (found beneath a stone in one of the branches of the celebrated Mammoth Caves of Kentucky,* at a dis-

* Omitted by Haldeman and Le Conte in the "Catalogue of the Described Coleoptera of the United States," lately published by the Smithsonian Institution.

tance of nearly five English miles from the mouth, and presented to the Royal Museum of Berlin), affords a signal instance of the rapid progress made in our science during the last ten years; eight species, including the one I have now the pleasure of describing, having in that period found a place in the European catalogue.

The absence of eyes at once distinguishes these insects from the members of the genus *Catops*, which they greatly resemble, and denotes the mode of life allotted them; they inhabit caves and other situations inaccessible, under ordinary circumstances, to the rays of the sun, and appear to form the connecting link between the genera *Catops* and *Leptinus*.

5. Adelops Wollastoni, n. sp. Fig. 7.

*A. breviter ovatus, ferrugineus vel fusco-testaceus, tenuiter sat dense fulvo-pubescens, subtilissime punctulatus, capite utrinque supra antennas angulatim producto, thorace transverso, basi leviter bisinuato.*
Length 1—1$\frac{1}{8}$ *lin.*

Short, ovate, ferruginous or dusky testaceous, finely and rather thickly fulvous pubescent, minutely punctate. Head with the crown depressed, gradually expanding on each side anteriorly as far as the base of the antennæ, where it is suddenly narrowed, thus presenting acute lateral angles; antennæ a trifle longer than the head, two basal joints elongate sub-obconic, third, fourth, fifth and sixth much more slender, of equal width *inter se*, but gradually decreasing in length (three rather longer than broad, six nearly quadrate), seventh suddenly dilated, obconic, eighth much smaller, transverse, ninth and tenth rather broader than the seventh, slightly transverse, eleventh shortish ovate, acuminate at the apex. Thorax twice as broad as long, a little wider than the elytra, gently and evenly rounded at the sides, much contracted in

front, apex slightly emarginate, anterior angles obtuse deflexed, posterior angles produced, acute, closely embracing the humeral angles of the elytra, the base obscurely lobed in the centre, therefore indistinctly bisinuate. Elytra nearly twice as long as the thorax, gently narrowed posteriorly, gradually rounded at the apex, sutural stria evident, evanescent near the scutellum, gradually approximating the suture with which it is confounded ere it reaches the apex; lateral margins narrowly but distinctly margined throughout, *i. e.* from the humeral to the sutural angles. In the male the anterior tarsi are 5-jointed, the two first strongly dilated, the third moderately so, the fourth obconic, slender, the fifth elongate, linear, supporting very small claws. In the female the anterior tarsi are 4-jointed, the basal joint somewhat robust, the second and third short, obconic, the terminal as in the male. In both sexes the tibiæ are moderately spinulose.

I sent examples of the insect above described to M. Jacquelin Duval, not feeling satisfied from the short diagnosis then published of his *A. meridionalis* [Ann. Ent. Soc. Fr. Ser. 3, ii. Bullet. 36 (1854)], whether or not my insect was referrible thereto, apprising him of my doubts, and begging that he would accept the specimens, and, in return, set these doubts at rest. After the lapse of twelve months he courteously sent me word that my insect was specifically distinct. In the meanwhile, however, M. Duval's species had been described by MM. Fairmaire and Laboulbène, in their Faun. Ent. Franc. Col. i. 310 (1855), and figured by MM. Duval and Migneaux, in the Gen. Col. Europ. (Silphides), tab. 35, fig. 175; from these sources I glean that *A. Wollastoni* differs from *meridionalis* in its shorter form, angulated head, and in the elytra presenting no trace of transverse striæ. I may add that a specimen sent to Herr Kraatz of

Berlin was returned by that gentleman as a nondescript *Adelops*.

Taken beneath decayed leaves, near Finchley, at the beginning of August, 1854, at the foot of an old wall, and again, at the same period, in the following year.

I have dedicated this species to T. Vernon Wollaston, Esq., M. A., F. L. S., Author of "Insecta Maderensia," a Treatise "on the Variation of Species, etc. etc."—whose qualifications as a naturalist, liberality, urbanity and purely disinterested and enthusiastic devotion to our science are well and widely known, both here and on the continent—in recognition of the numerous favours received at his hands, and of a debt of gratitude which my best efforts can never liquidate.

6. MYRMEDONIA COGNATA, Maerkel in Germar, Zeitschr. f. d. Entom. v. 202 (1844); Kraatz, Naturgesch. d. Insect. Deutschl. ii. 123, 5 (1856); G. R. Waterhouse, Proc. Ent. Soc. Lond. (4th August, 1856); Zool. 5246 (1856).

Found by Mr. Waterhouse in company with *Formica fuliginosa* near Brockenhurst. I met with a single individual on the stump of a recently felled tree at Hampstead on the 3rd of June, 1855.

7. MYRMEDONIA LATICOLLIS, Maerkel in Germar, Zeitschr. f. d. Entom. v. 203 (1844); Kraatz, Naturgesch. d. Insect. Deutschl. ii. 127, 11 (1856); G. R. Waterhouse, Proc. Ent. Soc. Lond., 4 Aug. 1856, Zool. 5246 (1856).

Taken by Mr. Waterhouse near Brockenhurst; by Mr. Edwin Shepherd at Norwood, and by myself near Croydon in company with *Formica fuliginosa*.

8. MYRMEDONIA LUGENS, Grav., Erich.; Kraatz, Naturgesch. d. Insect. Deutschl. ii. 126, 9 (1856); G. R. Waterhouse, Proc. Ent. Soc. Lond., 4 Aug. 1856, Zool. 5246 (1856).

Found by Mr. Waterhouse in company with *Formica fuliginosa* near Brockenhurst: previously taken, unaccompanied by the ant, by the same gentleman, early in the spring, at Sydenham.

9. HOMALOTA PLANA, Gyll., Erich; Power, Zool. 5177 (1856), [erroneously *deplanata*].

The true *Hom. deplanata* has, I believe, never been detected in Britain. Stephens' descriptions refer to *H. plana*, represented in his cabinet by *H. cuspidata*. *H. plana* occurs not unfrequently beneath bark of felled trees, in the neighbourhood of London; I have met with it abundantly at Highgate, Hampstead and Finchley; and Mr. Edwin Shepherd has taken it at Putney.

10. HOMALOTA CUSPIDATA, Erich.; Power, Zool. 5177 (1856).

As before observed, this insect stands in the Stephensian cabinet labelled *Homalota plana;* Stephens's descriptions, however, refer to the true *plana*, and are abridged from Gyllenhal, the Latin diagnosis being copied *verbatim*. I have found this insect at Colney-hatch, Hampstead and Mickleham; it occurs sparingly beneath the bark of dead trees.

11. HOMALOTA FLAVIPES, Grav., Erich.

Found by myself in nests of *Formica rufa* at Hampstead and Highgate, and by Mr. Waterhouse near Erith.

12. HOMALOTA CONFUSA, Maerkel in Germar, Zeitschr. f. d. Entom. v. 215, 41 (1844); Kraatz, Naturgesch. d. Insect. Deutschl. ii. 264, 71 (1856).

Several specimens taken by Mr. Waterhouse in the company of *Formica fuliginosa* near Brockenhurst.

13. HOMALOTA ANCEPS, Erich.

Taken by myself in nests of *Formica rufa* near Highgate, and by Mr. Waterhouse near Erith.

14. Oxypoda vittata, Maerkel in Germar, Zeitschr. f. d. Entom. v. 219 (1844); Kraatz, Naturgesch. d. Insect. Deutschl. ii. 163, 4 (1856); G. R. Waterhouse, Proc. Ent. Soc. Lond., 4 Aug. 1856, Zool. 5246 (1856).

Found by Mr. Waterhouse near Brockenhurst, and subsequently by myself near Croydon in company with *Formica fuliginosa*.

15. Oxypoda hæmorrhoa, Sahlb.; Kraatz, Naturgesch. d. Insect. Deutsch. ii. 184, 34 (1856). *Aleochara hæmorrhoa*, Sahlb., Ins. Fenn. i. 355, 20 (1834).

I have repeatedly met with this insect in nests of *Formica rufa* at Hampstead and Highgate; Mr. Waterhouse has found it with the same ant near Erith.

16. Oxypoda formiceticola, Maerkel in Germar, Zeitschr. f. d. Entom. iii. 213, 10 (1841); Kraatz, Naturgesch. d. Insect. Deutschl. ii. 182, 32 (1856).

I have found this species, but very sparingly, in nests of *Formica rufa*, both at Hampstead and Highgate; Mr. Waterhouse has taken it with this ant near Erith.

*Genus* THIASOPHILA, Kraatz, Naturgesch. d. Insect. Deutschl. ii. 69 (1856).

The insects comprised in this genus differ from the *Aleocharæ*, with which they had until recently been associated, in having the maxillary palpi 4-jointed, the labial palpi 3-jointed, the ligula more elongate and more deeply cleft, the thorax uneven, its posterior margin waved and its hinder angles nearly rectangular. Both species appear to be exclusively confined to ants' nests, viz. one to those of *Formica rufa*, the other to those of *Formica fuliginosa*; the first only has been detected in Britain.

17. Thiasophila angulata, Erich.; Kraatz, Naturgesch. d. Insect. Deutschl. ii. 70, 1 (1856). *Aleochara an-*

*gulata*, Erich.; Käf. d. Mark Brand. i. 360, 11 (1837); Gen. et Spec. Staph. 175, 35 (1839).

Taken by myself at Hampstead in November, 1855, and subsequently at Highgate in nests of *Formica rufa;* Mr. Waterhouse has likewise met with it under similar circumstances near Erith.

*Genus* HOMOEUSA, Kraatz, Naturgesch. d. Insect. Deutschl. ii. 76 (1856).

This genus, recently established by Herr Kraatz on the species which follows, and which had previously been located in *Euryusa*, may be at once distinguished by its pentamerous anterior tarsi, broader form, the acutely rectangular posterior angles of the thorax, and the abdomen narrowed from the base to the apex; and, furthermore, the ligula and the labium and its palpi, but which I have not had an opportunity of examining, afford important distinctive characters.

18. HOMOEUSA ACUMINATA, Maerkel; Kraatz, Naturgesch. d. Insect. Deutschl. ii. 78, 1 (1856). *Euryusa acuminata*, Maerkel, Ent. Zeit. Stett. iii. 143, 5 (1842), in Germar, Zeitschr. f. d. Entom. v. 228, 79 (1844); T. V. Wollaston, Zool. 5178 (1856).

A single specimen taken by Mr. Wollaston in a nest of *Formica fusca*, beneath a stone, near Bromley, Kent.

Having recently received from Herr Maerkel an example of his *E. acuminata*, and carefully compared Mr. Wollaston's specimen therewith, I am enabled unhesitatingly to pronounce their specific identity.

19. ATEMELES PARADOXUS, Grav.; Kraatz, Naturgesch. d. Insect. Deutschl. ii. 116, 1 (1856). *Lomechusa paradoxa*, Erich.

A single example found by Mr. Waterhouse at Hampstead, in company with *Formica fusca*.

20. Leptacinus formicetorum, Maerkel in Germar, Zeitschr. f. d. Entom. iii. 216, 19 (1841).

Found by myself in nests of *Formica rufa* at Hampstead and Highgate, and, I believe, taken likewise by Mr. Waterhouse, with the same ant, near Erith.

21. Quedius brevis, Erich. Gen. et Spec. Staph. 535, 17 (1840).

At the period Erichson was engaged on the great work above cited, this insect appears to have been of great rarity in collections, and his description was drawn up from the female only, of which he had a very limited number of specimens before him. Herr Maerkel, however, shortly after, met with it in considerable numbers in Saxony, and observes, in Germar, Zeitschr. f. d. Entom. iii. 217, 21 (1841), that it is subject to great variation in the puncturing of the thorax, *viz.* that the number of punctures in the dorsal series varies from one to three, and that occasionally one or other of these is wanting on one side; he furthermore indicates that the male differs from the female in having the anterior tarsi strongly dilated, and the sixth abdominal segment rather deeply notched, as is usual in the genus.

I have taken a fine series of this insect, exhibiting nearly all the variations mentioned by Herr Maerkel, in nests of *Formica rufa*, at Hampstead and Highgate, and Mr. Waterhouse has met with it, but very sparingly, with the same ant, near Erith.

*Genus* HETÆRIUS, Erich. in Klug, Jahrb. d. Insectenk. i. 156, (1834).

The present genus, of which the following is the only recorded species, stands out in bold relief amongst the legion of generic subdivisions into which modern systematists have hewn the family *Histeridæ:* the uni-articulate cylindrical club of the antennæ, the angularly dilated tibiæ and its

peculiar facies, happily conveyed by our artist, at once distinguish it.

22. HETÆRIUS SESQUICORNIS, Preyssler. Fig. 7.

*Hister sesquicornis*, Preyssler in Mayer, Sammlung Physikalischen Aufsätze, ii. 3, Tab. 3, fig. 26 (1792), *teste* Schmidt. Goebel in Ent. Zeit. Stett. xiv. 164 (1853). *Hister quadratus*, Kugelan in Schneider, Mag. Pt. iv. 529, 21 (1794); Payk. Mon. Hist. 96, Tab. xi. fig. 3 (1811); Sturm, Deutschl. Faun. Ins. i. 216, Tab. 17, fig. B. (1805). *Hetærius quadratus*, Erich., Käf. d. Mark Brand. i. 666 (1839); de Marseul, Ann. Ent. Soc. Fr. Ser. 3, iii. 140, Tab. 9, fig. 28 (1855); E. W. Janson, Proc. Ent. Soc. 5 May, 1856, Zool. 5151 (1856).

Found by myself at Hampstead, in nests of *Formica flava* and *fusca*, beneath stones on a loamy hedge-bank having a western aspect, in 1848 and again in 1856, where I repeatedly and assiduously searched for it during the intervening years, but without success.

*Observation.* Neither Paykull's nor Sturm's figures represent the antennæ correctly.

23. SAPRINUS PICEUS, Payk., Gyll., Erich., de Marseul, Ann. Ent. Soc. Fr. Ser. 3, iii. 505, Tab. 19, fig. 120 (1856). *Hister piceus*, Payk. Mon. Hist. 81, Tab. vii. fig. 7 (1811).

A single indigenous example only, taken by Mr. Waterhouse, last November, in a nest of *Formica rufa*, near Erith, has come beneath my notice. Stephens's description of *Dendrophilus piceus*, Illustr., Mand. iii. 160, 5 (1830), Manual, 152, 1226 (1839), is copied from Gyllenhal, the Latin diagnosis *verbatim*, but the insect placed to represent this species in his cabinet is very distinct and answers in no respect to the description, save perhaps in colour. The spe-

cies now under consideration differs totally in *habitus* from its congeners, its impunctate semi-opaque surface, long, slender, obsoletely armed legs, its pitchy red colour and sub-globose form, alienate it from the *Saprini;* but M. de Marseul, who has bestowed especial attention on the *Histeridæ*, and whose elaborate Monograph of the family, above cited, is well known to many of our readers, places this species in the genus *Saprinus*, remarking "Elle a un facies tout différent des autres *Saprinus*, on dirait un *Tribalus* on un *Dendrophilus;* mais aucun caractère de valeur ne la sépare de ce genre." I cannot, however, resist the conviction that future investigation will assign this insect to a distinct genus; lack of specimens at present precludes me from entering farther on the subject.

24. NITIDULA FLEXUOSA, Fab. Erich., T. J. Bold, Zool. 5111 (1856).

Mr. Bold considers that the specimens taken by him, near Newcastle-upon-Tyne, were probably introduced, and that the species cannot, upon their testimony, be looked upon as truly indigenous.

*Genus* OXYLÆMUS, Erich., Naturgesch. d. Insect. Deutschl. iii. 282 (1845).

The species constituting this genus, of which the two following are the sole recorded representatives, bear on a cursory view, a certain resemblance to some of the members of the genus *Rhyzophagus*, from which, however, they may be at once distinguished by their more cylindrical form, quadrifoveolated thorax, coarse sculpture, and tetramerous tarsi; other characters, on which I must not now enter, involving their location in a distinct family, have been elicited by the patient investigation of Erichson, who places this genus among the *Colydidæ*, group *Colydini*, after *Teredus*. *Oxylæmus* differs from *Teredus* in having the antennæ

apparently consisting of ten joints only, the eleventh being widest at its base, nearly hemispherical, and so closely applied to the apex of the tenth as to be not very readily distinguishable; the capitulum or club has thus the appearance of being solid or uni-articulate, whereas in *Teredus* it is distinctly bi-articulate, the eleventh joint being much narrower at its base than in the middle, globose: in *Oxylæmus* the prosternum is produced, forming an acute triangular projection beneath the head, not present in *Teredus*.

25. Oxylæmus cylindricus, Panz., Erich., Naturgesch. d. Insect. Deutschl. iii. 283, 1 (1845). *Lyctus cylindricus*, Panzer, Faun. Ent. Germ. Fas. 35, fig. 18 (1796). Fig. 1.

A single specimen only of this species has come under my notice, it was captured by Mr. Edward Sheppard, beneath bark of oak, near Lyndhurst.

26. Oxylæmus variolosus, Leon Dufour.

*Rhyzophagus variolosus*, Dufour in Bullet. de la Soc. des Sciences, Lettres et Arts de Pau, 94, 591 (1843); von Siebold in Ent. Zeit. Stett. x. 311 (1849). *Oxylæmus cæsus*, Erich., Naturgesch. d. Insect. Deutschl. iii. 284, 2 (1845), *teste* Schaum, Ent. Zeit. Stett. xi. 181 (1850); Sturm, Deutschl. Faun. Ins. xx. 64, Tab. 370 (1849).

Of all the additions made during late years to our list, the present is perhaps the most interesting, and to it I beg to call the earnest attention of those who are pursuing the important subject of geographical distribution.

Three specimens of this insect have come under my notice.

The first taken by my assiduous and successful friend Mr. T. P. Dossetor, on the 6th of October, 1850, at Colney-hatch, Middlesex, crawling up the trunk of an oak, within a short distance of a fungus, whither it was probably on its way.

The second found by Mr. Pelerin in October, 1854, in a sand-pit at Charlton, Kent.

The third captured by Mr. Dossetor, on the 19th of the present month, in brushing amongst herbage in the immediate vicinity of the tree on which the first individual was found, and presented to me, still alive, by that gentleman.

It appears to be a species of excessively rare occurrence on the continent, and to have been found exclusively in high mountainous districts; the only two instances, I believe, on record of its capture are, by M. Leon Dufour in "Excursion entomologique dans les Montagnes de la Vallée d'Ossau" who says "Habite l'écorce du chêne;" and by Herr Gressner, in company with *Formica fuliginosa*, in Saxony.

27. Antherophagus nigricornis, Fab.; T. J. Bold, Zool. 5003 (1856).
28. Tychius flavicollis, Schönh. (not Kirby), Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 31, 4 (1856).
29. Tychius hæmatocephalus, Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 31, 3 (1856).
30. Smicronyx cicur, Reich., Schönh., Germ.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 31, 2 (1856).
31. Baris Lepidii, Germar, Col. Spec. Nov. 200, 322 (1824). *Baridius Lepidii*, Schönh.

On the 24th of March, 1848, I met with this insect in profusion in a marsh near Tottenham, Middlesex, beneath rejectamenta of the river Lea. As I had then just commenced collecting *Brachelytra*, and ought else interested me but little, I secured but few specimens; the major portion of which were at the time distributed among my friends and correspondents under the name of *Baris picicornis*, to which I negligently without examination referred them. It probably inhabits the stem of some marsh plant. Redtenbacher says it feeds in the stalk of the cauliflower. As it is not

improbable that the present species may have been confounded by others with the nearly allied *B. picicornis*, I have drawn up, as briefly as practicable, the distinctive characters of the two species.

*Baris picicornis*, Marsham, Ent. Brit. 276, 115 (1802), Steph. *B. Abrotani*, Germar, Col. Spec. Nov. 202, 324 (1824); *Baridius picicornis*, Schönh., Walton.

Steel blue; rostrum finely, conspicuously and thickly punctate above, deeply and coarsely at the sides. Thorax thickly and deeply punctate, the punctures having but a slight tendency to assume an oval form. Elytra widest at the shoulders, gradually narrowed to the apex; striæ very deep, impunctate, unless viewed under a strong magnifying power and in a favourable light, when traces of very fine, closely set punctures are observable at the bottom of them.

Found at the roots of *Reseda lutea*. In warm still weather the insect may occasionally be seen at the base of the lower lateral shoots or branches, but, according to my experience, never on the leaves or upper portions of the plant.

*Baris Lepidii*, Germar, *loc. sup. cit.*

Deep blue-black. Rostrum very finely, scarcely perceptibly punctate above, deeply strigose at the sides behind the antennæ. Thorax sparsely and deeply punctate, the punctures almost linear. Elytra distinctly widest a little before the middle, thence rather abruptly narrowed towards the apex; striæ deep, distinctly, remotely punctate.

32. Orchestes rufus, Oliv.; Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 32, 3 (1856).

33. Orchestes Iota, Fab. Germ., Gyll., Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 33, 9 (1856).

34. Cœliodes subrufus, Herbst, Gyll., Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 35, 4 (1856).
35. Bagous limosus, Gyll., Schönh.; Walton, Brit. Mus. Cat. of Brit. Rynchoph. 36, 2 (1856).
36. Bagous Petrosus, Herbst, Germ., Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 36, 3 (1856).
37. Bagous Frit, Herbst? Gyll., Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 36, 4 (1856).
38. Bagous lutulosus, Gyll., Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 36, 5 (1856).
39. Pachyrhinus canaliculatus (Kirby), Schönh. Supp.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 38, 8 (1856).
40. Ceutorhynchus impressicollis (Little); Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 39, 12 (1856).

Mr. Walton says "*nec depressicollis*," Gyll., under which name I have cited it in the Annual List, 1855.

41. Ceutorhynchus Crux, Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 40, 19 (1856).

Not *Aubei*, Schönh., according to Mr. Walton, under which specific title it appears in the Annual List of 1855.

42. Ceutorhynchus crassidentatus (Marshall), Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 40, 20 (1856).
43. Ceutorhynchus uliginosus (Walton), Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 40, 21 (1856).
44. Ceutorhynchus biguttatus (Waterh.), Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 41, 28 (1856).
45. Ceutorhynchus hispidulus (Stevens), Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 41, 30 (1856).
46. Ceutorhynchus chalybæus, Germ., Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 41, 33 (1856).

47. AMALUS MINIMUS, Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 42, 3 (1856).

48. GYMNETRON COLLINUS, Gyll. Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 44, 8 (1856).

Observation. *Gymnetron collina*, Steph. Man., is referred by Mr. Walton to *G. Pascuorum*, Gyll.

49. MIARUS PLANTARUM (Dej.), Schönh., Germ.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 44, 2 (1856).

50. PHLŒOPHAGUS SPADIX? Herbst, Schönh.; Walton, Brit. Mus. Cat. of Brit. Rhynchoph. 46, 2 (1856).

*Genus* CRYPHALUS, Erich. Archiv., 1836, I., 61.

Distinguished from *Bostrichus* by the antennæ having the funiculus quadriarticulate; in *Bostrichus*, as restricted by Erichson, it consists of five joints.

51. CRYPHALUS BINODULUS (Weber), Ratzeb., Forst. Insect. i. 163, Tab. 13, fig. 18 (1837); E. W. Janson, Proc. Ent. Soc. Lond., 1 Sept. 1856; Zool. 5305 (1856). Fig. 9.

I found several specimens in the bark of a dying aspen (*Populus tremula*), near Highgate, at the end of August and beginning of September.

52. MONOTOMA CONICICOLLIS, Aubé, Ann. Ent. Soc. Fr. vi. 455, 1, Tab. 17, fig. 1 (1837).

Taken by myself in a nest of *Formica rufa* near Highgate.

53. MONOTOMA ANGUSTICOLLIS, Gyll., Aubé, Ann. Ent. Soc. Fr. vi. 457, 2, Tab. 17, fig. 2 (1837). *Cerylon angusticolle*, Gyll. Ins. Suec. iv. app. 634 (1827).

Found by myself in a nest of *Formica rufa* near Highgate.

The foregoing list will have made the reader acquainted with the publication of Mr. Walton's Catalogue of British Rhynchophora. In reference thereto, I consider it my duty

to state, that no sooner did the liberal and learned author ascertain that I had undertaken a synonymic enumeration of the British *Coleoptera*, than he forthwith transmitted me his manuscripts, with the unqualified permission to avail myself of the valuable and otherwise unattainable information with which they were replete. Limited leisure and consequent slow progress in my task, rendering it probable that a considerable period would elapse ere I arrived at this group, Dr. Gray suggested to Mr. Walton that his Catalogue should be immediately made available to the public. To this he acceded, and, on the 13th of the present month, an unostentatious duodecimo in the familiar official blue wrappers—entitled "A List of the British Curculionidæ, with Synonyma. By John Walton, F. L. S., &c. London. Printed by order of the Trustees. 1856"—was published by the authorities of the British Museum.

London,
*October 31st*, 1856.

## Postscript.

*Antherophagus nigricornis*, F., is *A. silaceus*, Gyll., Steph., and should, therefore, not have been included in the foregoing List. The Fabrician name has priority.

54. Tropideres sepicola, Herbst.

A single example found on the 18th of August last, by Mr. F. Plant, of Leicester, in a decayed oak bough, of which he had carried home a bag-full for examination from Buddon Wood, near Quorndon, Leicestershire. The specimen was sent up for determination to Mr. F. Smith, and has been identified by that gentleman with continental examples in the National Collection. A figure of it will, with our Editor's permission, be given in the plate of next year's Annual.

*November 24th*, 1856.

# COLEOPTERA.

## Observations on the Myrmecophilous Coleoptera, or Ants-Nest Beetles of Britain. Accompanied by plain Instructions for obtaining them, and a List of the Species hitherto ascertained as indigenous.

By Edward W. Janson, Sec. Ent. Soc.

Most of my readers are doubtless aware that ants, however hostile to their fellow insects in general, evince the greatest amity for others, with whom they not only share their habitations, but watch with the greatest solicitude; bearing them tenderly back should they stray aboard, and hurrying them off to the innermost recesses of their subterranean burrows on the approach of danger; I allude to *Claviger testaceus*, Preyssler (*foveolatus*, Müll., Westw., Steph.), and *Atemeles emarginatus*, Grav. (*paradoxus*, Steph.), which have long since found a place in our lists, and whose habits have been familiarly described in our own language. But perhaps few are prepared to learn that nearly fifty species of *Coleoptera* have been ascertained by continental Entomologists to pass at least a portion of their lives exclusively in the nests of various species of ants. Such, however, is the fact elicited by the assiduous investigations of Aubé and Chevrolat in France; the two Maerkels, von Kiesenwetter, Grimm and others in Germany; Mannerheim in Finland; Schiödte in Denmark, and Motschoulsky in Russia.

The apathy evinced by our collectors, some of whom must have been well aware of the success achieved by our continental brethren in the examination of ants' nests, appears to me attributable to several causes. In the first place, the major portion of the insects attendant on ants pertain to the *Brachelytra*, a group of *Coleoptera* almost universally neglected in Britain, the investigation of which Stephens himself appears always to have postponed, *de die in diem*, alas! until too late, throwing them in, *rudis indigestaque moles*, as mere ballast at the end of his works, although indicating their true position after *Necrophaga* in his synthetical tabulation. The example thus set was almost unexceptionally followed: collectors pinned the labels in their cabinets in the sequence in which they were presented to them in the "Nomenclature," in most cases omitting the *Brachelytra* altogether, and thus the existence of a group, reckoning probably not far short of a fourth of our indigenous *Coleoptera*, has been generally ignored.

Another cause, to which the ignorance prevailing with respect to our ants-nest insects may in a great measure be ascribed, is the lack of that important, nay essential, element of success in all research—an acquaintance with the *modus operandi*. To supply this is one of the chief objects of the present paper.

The ants, to which the attention of myself and the two congenial friends with whose names the reader will have become familar in the "List of new species," had been exclusively devoted, are five in number.

1. *Formica rufa*, L. (the Wood Ant).
2. *Formica fuliginosa*, Latr. (the Jet Ant).
3. *Formica fusca*, L. (the Ash-coloured Ant).
4. *Formica flava*, De Geer (the Turf or Common Yellow Ant).

5. *Myrmica rubra*, L. (the Red Ant), with which we have probably hitherto confounded one or more of the allied species.

We have not, up to the present time, been able to find a colony of *Formica cunicularia*, Latr. (the Mining Ant). Mr. F. Smith, in his British Museum "Catalogue of British Aculeate Hymenoptera" (1851), gives Highgate as a locality for this species; but the spot on which the nest was situate, once so wild and lovely, is now occupied by a square mass of bricks and mortar, ycleped "an eligible family residence," beneath which lies the dust of the last member of that once busy, happy throng. Those who have an opportunity of examining the nests of this species, which generally constructs its habitation in old decaying trees, especially oaks, will probably find a recompense for their trouble in the discovery of *Euryusa sinuata*, at present unknown as British.

Formica rufa, as its popular appellation denotes, frequents woods, where it excavates numerous capacious cells in the earth, raising over them a superstructure in the form of a conical hillock, consisting of fragments of twigs, leaves, pebbles, in fact of any dry portable object falling within its reach. The purport of this mound appears to be to shelter the nest itself from cold and more especially from wet. These hillocks in the course of years gradually attain formidable dimensions. On the first warm days in March, sometimes at the end of February, the wood ant awakens from its long winter's sleep and may be seen basking in clusters on the hillocks; this is the period for commencing ants-nest operations.

Having conveyed a supply of large rough stones—smooth ones will not do—or failing these, bricks, to the wood which is to be the scene of action, and where, I presume, are found

at least several colonies of the ant, place three or four of them around the hillock on its sloping sides: treat all the nests in the same manner. The nests must be visited as frequently as practicable during the greater part of the year; nearly all the beetles enumerated in the subjoined list as cohabiting with this ant were found either on the under surface of the stones or beneath them. *Myrmedonia humeralis*, however, I have only once met with in a solitary individual, beneath the stones; but occasionally in some numbers under leaves and at the roots of grass in the immediate vicinity of the nest.

As spring advances and the ants betake themselves to labour at the extension of the hillock, a piece of old, rough, dry wood should be placed on the summit; this will in a few days be gradually covered by the newly brought material, and should be occasionally withdrawn and smartly tapped over a large sheet of paper or cloth; it was thus I succeeded in taking *Dinarda Maerkelii*, and, in the autumn, *Monotoma angusticollis* and *conicicollis*.

The examination should always be made early in the morning, before ten; in the heat of the day I never met with success. A fine morning succeeding a wet day after dry weather is peculiarly favourable, and should always be devoted to a trip to the ants' nests.

In the sultry months of July and August, the ants' nests should not be touched: my searches have ever been fruitless at that period of the year;* the young brood of ants, upon

* Although the only specimens of *Dinarda Maerkelii* I have yet secured occurred on the 13th of July and 24th of August, I am nevertheless disposed to think that had I used the pieces of wood, above recommended, at an earlier period of the year, I should probably have met with it more abundantly, as on the continent it is always taken early in the spring, and occasionally appears again late in the autumn.

which the welfare of the colony will next year mainly depend, is now assuming the imago state, and the old workers exhibit an irritability not observable at other times.

At the end of August or beginning of September, the collector should resume his researches. Several of the species found in the spring re-appear in the autumn, and two—*Monotoma angusticollis* and *conicicollis*—are to be met with then only. He that would succeed in the investigation of ants' nests must be prepared to fail; according to my experience about one nest only in twenty contains beetles: during the last three years I have tried upwards of a hundred nests, which has involved the transport in some cases for miles of no trifling weight of stones and bricks, for these are not to be found in woods, but by dint of sheer perseverance I have discovered within the metropolitan district by far the greater proportion of the species known in France and Germany to frequent the nests of *Formica rufa*.

In France, I am informed, a most reprehensible plan is practised of tearing the ant-hill to pieces, throwing it into a sieve, and sifting it over a white cloth; I presume that this proceeding is to a certain extent successful, but I think that every rightminded person will bear with me in condemning such wanton destruction as totally unjustifiable, for sooner or later the entire colony must miserably perish. A gentleman, with whom I once expostulated on the cruelty of this plan, gravely assured me that he always restored the hillock to its previous state, as though these industrious, indomitable creatures heaped up sticks and stones without plan or order. Would the confused mass of material he raised prevent the first rains which fell from penetrating the nest, flooding the

Maerkel says (Germar, Zeitschr. f. d. Entom. iii. 215) that "of all the *Myrmecophili* this makes its appearance the earliest in the year, often, in favourable weather, in the first days of March."

subterranean cells and involving its inmates in certain death? Let him convert a wax taper into honey-comb, or an old post into the symmetrical nest of the wasp—I will then admit his competency to rebuild an ant-hillock.

To urge the inconvenience to which the plan of the French Entomologists must subject the operator, and of which Mr. Douglas, in his "World of Insects," p. 240, gives an amusing, but I can vouchsafe authentic account, will, I fear, not deter some from at all events essaying it; there are, I am sorry to say, those in our ranks, whose sole object is to *get up*, as it is styled, *a collection*, regardless of *how* this aim is attained, who would appear with the disciples of Loyola to hold that the end justifies the means. As a warning to these, I will state that in France the examination of ants' nests has long been strictly forbidden, it having soon been discovered by the proprietors of woods, and others interested in the preservation of game, that the reckless proceedings of the Entomologists threatened speedily to extirpate the ants, and thus deprive the young pheasants and other game birds of their chief source of subsistence. The course I adopt, and have above described, is, I believe, invariably followed in Germany, as it occasions but little discomfiture and no injury to the ants.

Formica fuliginosa generally constructs its habitation in the interior of hollow trees, especially oaks. The nest itself is usually inaccessible; the entrance to it, however, will be readily found by watching the streams of ants; it is nearly always situated at or near the roots of the tree. On examination it will be observed that the ants have ejected from it a mass of comminuted, moist and fermenting wood, which should be taken up quickly, thrown on to a sheet of paper or white cloth, and carefully looked through. The bark surrounding the entrance should then be closely searched; it is

on this that I have taken the scarce and pretty *Amphotis* (*Nitidula*, Steph.) *marginata*; the sodden wood-dust and fragments should now be again placed in the spot whence they were taken.

The next step is carefully to search all round the base of the tree at its junction with the ground: if herbage grows here, press it gently back, and narrowly investigate the space between it and the tree; here may be found *Myrmedonia laticollis*, which, rolling its abdomen over its thorax, pertinaciously simulates death, and thus often eludes even the keen eye of the collector. Attention may now be turned to the trunk of the tree: the inequalities in the bark should be carefully peered into; snugly ensconced therein, and likewise running among the ants, which it so closely resembles in size, colour and gait, as to be with difficulty distinguished, the beautiful *Myrmedonia funesta* occurs. The glittering cohorts ascending and descending the trunk in such admirable order form, however, but a fraction of the vast army which garrisons the tree. It is more than probable that the collector will, long ere his operations have arrived at the present stage, have received ample intimation that a large proportion of the colony is actively engaged on *terra firma*, and, unless he has instinctively taken a precaution, the necessity of which I ought, perhaps long since, to have impressed upon him—namely, of binding the trouser legs and coat sleeves tightly about the ankles and wrists—he will, I fear, have become painfully aware that *Formica* is as zealous and persevering an investigator of *Homo*, as the man is of the ant. Upon a careful inspection of the ground it will be perceived that the ants depart from and return to the nest by certain tracks or paths; these should be followed attentively for some distance, and stones, chips of wood, or dead leaves, lying in or beside them, lifted up and examined.

Formica fusca delights in light loamy banks, especially such as have a western aspect, and are thus accessible to the first warm rays of sunshine. Its nests are subterranean, and consist of a succession of cells connected by narrow passages; the entrance is almost invariably situate beneath a stone: on lifting this carefully, so as not to disturb the adjacent earth, which, should it fall in, would completely thwart the object in view, a sort of vestibule or ante-chamber, varying in size according to the magnitute of the superimposed stone of which it forms the roof, presents itself; the stone having been placed in a cloth or shallow bag, the floor of this chamber must be minutely examined—here it is that *Hetærius sesquicornis*, Preyssler (*quadratus*, Payk., Eric.) occurs, but the ants should be narrowly watched as they retreat, which they invariably do in all haste, to the adjoining cell, for I have more than once taken the beetle from the mouths of its foster parents as it was being borne off to the interior of the nest. The floor of the vestibule being thoroughly searched, the cloth or bag should be opened and the stone taken out and examined, for it is possible that some rarity may have been reposing or promenading on its under surface at the time it was withdrawn. The investigation of the nest is now completed for the day; let the stone be carefully replaced in precisely the same position it previously occupied, and the collector proceed in search of others, treating all with which he meets in the same way. And if after a long day's search, weary and perhaps disappointed at not having found *Hetærius*, let him not, I entreat, churlishly destroy the homes of the unoffending ants, and with them all chance of future success—the morrow may prove more propitious; this I can assure him, the simple plan just described is the one I have invariably pursued, vainly day after day for seven years it i true, but at length successfully.

On the first warm days in May, *Atemeles emarginatus* and *paradoxus* makes its appearance on banks tenanted by this ant, and may be seen running in the vicinity of the nests hotly pursued by its anxious guardians; let a careful watch be kept on the ants themselves, as many may be arrested on their return bearing the *Atemeles*, complacently rolled up, in their mouths. I have likewise taken, by brushing herbage in the neighbourhood of the nests of this ant, the rare *Aleochara ruficornis*, Grav. (*Ceranota Daltoni*, Steph.), and have little or no doubt that it is a truly Myrmecophilous insect, although not hitherto recorded as such.

Formica flava, when inhabiting meadows or the green sward of the woodland, constructs its abode in and beneath a hemispherical mound of earth, sometimes entirely the result of its own toil, but occasionally, I have observed, it avails itself of the hillocks thrown up by the mole. Where, however, stones abound, it forms its nest after the fashion of those of *F. fusca*. It is to the latter kind of nests that I would especially direct the collector's notice, for all my exertions have hitherto proved unavailing in the detection of *Myrmecophili* in the mounds.

In chalky districts, more particularly on hill sides, the flints, which lie scattered in countless numbers, should be carefully lifted, never omitting the precaution, if ants are observed beneath, of quickly enveloping the stone in a cloth: in the cells thus exposed to view the wonderful *Claviger testaceus*, Preyssler (*foveolatus*, Müller, Westw., Steph.) is found; and here I have twice met with a species of *Trichonyx*, concerning the identity of which, not feeling certain, I had better at present observe silence. I think it right again to remind the collector, that he must watch the ants attentively as they retire, for they almost invariably endeavour to carry off the beetles, and that the cells being well examined, and all cavities

on the under surface of the flint well searched, this should be replaced in its former position. At Mickleham, where, in the spring and early summer, *Claviger testaceus* might formerly to a certainty be found, I have for the last two years repeatedly but fruitlessly looked for it; but few colonies of the ant, which once abounded, are now to be met with: this I am inclined to attribute mainly if not entirely to the omission, during a series of years, on the part of those engaged in searching for the *Claviger*, to replace the stones over the ants' nests, thus leaving the inmates to perish. In Germany and France, a second species of *Claviger* (*C. longicornis*, Müller) is found in the nests of this ant; if assiduously searched for, it would probably be met with here.

Myrmica rubra occurs in similar situations, and constructs its nests in the same way as the preceding species; the mode of search is therefore identical. This ant is not in good repute with continental Entomologists, as beetles are rarely found in its company; with it, however, *Myrmedonia* (*Astilbus*, Steph.) *canaliculata* usually abounds, and I have likewise occasionally met with a solitary specimen of *Atemeles emarginatus*, and once, near Dorking, a single individual of the scarce *Staphylinus latebricola*, Grav. (*æriceps*, Kirby, Steph.)

I would remark, that an investigation of the nests of several other species of ants, not alluded to in this paper, would probably result in important discoveries. On the part which the *Myrmecophili* play in the economy of the ants' nest, neither time nor space permit me, on the present occasion, even to touch; the consideration of this important question must of necessity be deferred until a future opportunity. My primary object, as I have before stated, in hurriedly penning these lines, is to point out *how* ants' nests may be profitably searched; and, furthermore, by enumerating the

riches already discovered, to offer a substantial stimulus to those who may feel disposed to turn their attention to this most interesting inquiry. And, in conclusion, I earnestly invite those who may meet with any difficulty to address me; and I give them the assurance that my best efforts shall be exerted to smooth the path, and such information as I possess be most cheerfully communicated.

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A List *of the* Myrmecophilous Coleoptera *at present known to inhabit Britain, together with an indication of the Species of Ant with which they are usually found associated.*

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| Trichonyx ———? . . . . | Formica flava. |
| Claviger testaceus, Preyssl. . . | ——— flava, and fusca. |
| Myrmedonia canaliculata, F. . . | ——— flava, and Myrmica rubra. |
| ——— limbata, Payk. . . | ——— flava, and fuliginosa. |
| ——— humeralis, Grav. . | ——— rufa. |
| ——— cognata, Maerk . . | ——— fuliginosa. |
| ——— funesta, Grav. . . | ——— fuliginosa. |
| ——— laticollis, Maerk. . | ——— fuliginosa. |
| ——— lugens, Grav. . . | ——— fuliginosa. |
| ——— Haworthi, Steph. . | ——— rufa? |
| ——— collaris, Payk. . . | Myrmica rubra? |
| Homalota flavipes, Grav. . . . | Formica rufa. |
| ——— confusa, Maerk. . . | ——— fuliginosa. |
| ——— anceps, Eric. . . . | ——— rufa. |
| Oxypoda vittata, Maerk. . . . | ——— fuliginosa. |
| ——— hæmorrhoa, Sahlb. . | ——— rufa. |
| ——— formiceticola, Maerk. . | ——— rufa. |
| Aleochara ruficornis, Grav. . . | ——— fusca. |
| Thiasophila angulata, Eric. . . | ——— rufa. |
| Homoeusa acuminata, Maerk.* . | ——— fusca. |
| Dinarda Maerkelii, Kiesw. . . | ——— rufa. |
| Lomechusa strumosa, F. . . . | ——— rufa. |

* In Germany this species appears to be found with *Formica fuliginosa* exclusively.

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| Atemeles paradoxus, Grav. . . | Formica fusca. |
| ——— emarginatus, Grav. . . | ——— fusca, and Myrmica rubra. |
| Leptacinus formicetorum, Maerk. | ——— rufa. |
| Staphylinus latebricola, Grav. . | Myrmica rubra. |
| Quedius brevis, Eric. . . . . | Formica rufa. |
| Hetærius sesquicornis, Preyssl. . | ——— fusca, and flava. |
| Dendrophilus punctatus, Ent. Hefte | ——— rufa. |
| ——— pygmæus, L. . . | ——— rufa. |
| Saprinus piceus, Payk. . . . . | ——— rufa. |
| Amphotis marginata, F. . . . | ——— fuliginosa. |
| Cetonia aurata, L. (Larva) . . | ——— rufa. |
| Clythra 4-punctata, L. (Larva) . | ——— rufa. |
| Monotoma conicicollis, Aubé . . | ——— rufa. |
| ——— angusticollis, Gyll. . | ——— rufa. |

2, Alma Road, Upper Holloway,
*November 8th*, 1856.

# LEPIDOPTERA.

## New British Species in 1856.

(By the Editor.)

The past season has *generally* been unusually prolific for Lepidoptera. A few of our correspondents have indeed complained of the paucity of "moths at sugar;" hence, as we have no reason to suppose that those thus complaining were themselves to blame, we are actually led to believe, that, whilst in one locality Lepidoptera were abundant, in another they were very scarce. But though we think the season has been an unusually good one, it does not thereby follow that we have an extra crop of novelties. We have no new *Sphinx*, no new *Bombyx*, but one new *Noctua*, and no new *Geometra*. Were there no Micro-Lepidoptera, our list of novelties would indeed be a poor one, but, fortunately, in the Tineina the crop of new species is unusually large. This shows that there is yet a mine that will repay working, and we trust, when the Tortricina have been monographed, we shall find novelties there hardly less plentiful. Ten years ago "a new British moth of the family of the *Tineidæ*" was considered a most interesting topic; now *ten new species* hardly attract so much attention.

Much no doubt is yet to be done by learning what species

are likely to occur here, and looking for them in the haunts and among the plants which they frequent abroad. When this is done systematically, not in one locality only, but in several, we shall expect to have annually to record the addition of some five or six *Noctuæ* to our lists. *Leucania Vitellina* is added this year, but how much longer are we to wait for *Leucania L.-Album?* We are strongly disposed to fancy specimens of it must exist unknown in some of the 500 collections of *Lepidoptera* in the country.

The new British species I proceed to notice are as follows:—

Leucania Vitellina.
Nyctegretes Achatinella.
Tortrix latiorana.
Dicrorampha Tanaceti.
Tinea Merdella.
Depressaria Libanotidella.
Coleophora Genistæ.
" Inflatæ.
" Virgaureæ.
Coleophora Vitisella.
Laverna conturbatella.
" Raschkiella.
Elachista tæniatella.
Lithocolletis Torminella.
Nepticula luteella.
" Regiella.
" atricollis.

### Leucania vitellina, Hübner.

This belongs to the same section of the genus *Leucania* as *Conigera*. The anterior wings are pale yellowish, the hind wings whitish; and we notice besides a great difference in the markings, as the inner line is hardly angulated, terminating on the middle of the inner margin, and the lower end of the reniform stigma is not white.

Referring to the table of *Leucania* at page 187 of the Manual of British Butterflies and Moths, this species would be placed in the same class with *Conigera*, B.; but would easily be recognized from that species by the characters above given.

Not having a good specimen before me, I reserve a full

description for another opportunity. Mr. Cooke's specimen reminds one of the pale variety of *Xanthia Cerago*, and Duponchel has placed *Vitellina* in the genus *Xanthia*, probably on account of this resemblance.

The larva feeds on grass, through the winter, changing to pupa in February, March or April; the perfect insect appears in August and September; it occurs in Southern and Central France; and in some years is much commoner than in others.

This species is added to our list from a specimen having been taken at Brighton, by Mr. Henry Cooke, who thus announced its capture in the "Substitute:" "The locality in which I obtained this species was certainly rather a strange one; it was in my own little garden in the centre of this town. I saw the insect on the wing, and, without suspecting it was anything uncommon, made more than one attempt to catch it with my net, but failed; it went into a dense plant of *Epilobium*, and I could not drive it out. In accordance with my nightly custom I placed honey on such posts and flower-sticks as were available, and in a few minutes I saw the moth re-appear, and after hovering about for a short time it went straight to the nearest honey-bait and settled quietly. I then saw it was a stranger, and lost no time in boxing it: a little chloroform finished the business, and the insect is now in my cabinet, and numbered amongst my treasures."

### Nyctegretes Achatinella, Hübner.

*Alis anticis rufo-griseis, lineis duabus valde convergentibus albis, strigulaque interjecta albida.*

Exp. al. 9 lin.

Head, face, palpi and antennæ pale reddish-grey. Anterior wings *reddish grey*, shaded with reddish brown, *with two*

*conspicuous oblique whitish transverse lines*, one from the costa near the base to the middle of the inner margin, the other from the costa near the apex to the inner margin beyond the middle; nearly midway between these two lines is an elongate whitish spot on the disc; cilia reddish-grey. Posterior wings pale grey, with paler cilia.

Not nearly allied to any known species.

Two specimens were taken among *Echium* at Folkestone in July. One by Mr. Stevens, the other by Mr. Tompkins.

Zeller says of this species (Isis, 1848, p. 651), "It is widely spread, but, probably, on account of its nocturnal flight, little known. It frequents dry, weedy slopes, keeps quite quiet by day; and only appears on the wing in the evening, when it is easily captured."

The larva is unknown.

### Tortrix latiorana, n. sp.

*Alis anticis latiusculis dilute ochreis, fascia oblique brunnea obsoleta, macula costali pone medium vix distinctiore, punctis nigrescentibus marginem posticum versus nullis.*

Exp. al. 8—10 lin.

Anterior wings pale-ochreous, with an indistinct oblique pale brown band from the costa before the middle, which can rarely be traced to the inner margin. Before the apex is a small costal blotch of a similar colour. *In many specimens both these markings are obliterated.* Posterior wings *white;* ciliæ whitish, *with a grey line at their origin in the* ♂.

The wings are shorter and more stumpy than in *Spectrana*, the markings rarely as distinct; the hind wings whiter, and the grey line in the fringe of the male furnishes a very distinctive character. The absence of the

two or three dark brown spots before the middle of the hind margin of the fore wings is also a noticeable distinction.

Taken by Mr. S. Stevens, in a salt marsh at Southend, in July.

It is surprising that the Linnæan *Gnomana*, another species nearly allied to *Spectrana*, has not yet occurred here. Herrich-Schäffer says of it, "abundant everywhere on hawthorn."

DICRORAMPHA TANACETI, n. sp.

*Alis anticis latiusculis griseo-olivaceis, striis transversis obsoletis pone medium plumbeis, macula magna triangulari dorsali dilutiore; alis posticis dilute griseis.*

Exp. al. 6—6½ lin.

Head, face and palpi greyish-olive. Anterior wings rather broad, greyish-olive, with some faint transverse leaden markings beyond the middle; on the middle of the inner margin is a triangular blotch paler than the ground colour, which is sharply defined towards the base, but gradually shades off at its hinder edge. The form of this marking reminds one strongly of *D. Artemisiæ* and *D. Acuminatana*, and in the form of the wings the insect resembles *Artemisiæ*, but the ground colour is totally different. Cilia pale yellowish-olive, darker externally. Posterior wings pale grey, with pale greyish-ochreous cilia, thus much paler than in *Artemisiæ*.

Several specimens of this insect have been taken by Mr. Thompson of Crewe, among tansy. And I have a specimen from Scotland, which I have had by me several years.

It is of course rather hazardous to describe a new species of this group, but before doing so specimens of this insect were submitted to Professor Zeller for his opinion, and he could not find that they agreed with any known species.

### Tinea Merdella, Zeller.

*Alis anticis* DILUTE *ochreo-griseis,* NITIDIS, *strigula abbreviata basali prope costam, maculis duabus ante medium maculaque majori pone medium nigrescentibus.*

Exp. al. 5—7½ lin.

Head and face greyish-ochreous (paler than in *Pellionella*). Palpi pale grey, the long bristles dark brown. Antennæ rather dark grey. Anterior wings pale greyish-ochreous (paler and more silky looking than in *Pellionella*), with a short blackish streak from the base near the costa; before the middle are two blackish spots, one in the fold, the other longer and rather anterior to it on the disc; beyond the middle is a larger spot; cilia unicolorous, very pale greyish-ochreous. Posterior wings whitish grey, with pale grey cilia.

Best distinguished from *Pellionella* by the paler, more silky ground colour of the anterior wings.

Discovered at Liverpool in a wool warehouse by Mr. N. Cooke, who thus announced the capture in the Intelligencer, p. 125: "On the 11th inst. and again to-day (July 14th), I have taken a number of specimens of this species in a wool warehouse; the room contains wool from Naples, Trieste, Peru and Australia, and they may have been imported from any of these places in the larva state; but who is to prove it? I believe they have bred in the room, and therefore claim a place in the British list for the species, as I think it has just as much right there as some other species taken in and about warehouses."

There can be little doubt that many omnivorous feeders stand much chance of being imported, and when once here of becoming naturalized.

Some of the *Œcophoræ, Ephestiæ* and *Tineæ* are species

extremely liable to be imported feeding on dried vegetable or animal matter, and it is precisely in these genera that several accidental additions to our collections from the metropolis and our outports have occurred.

DEPRESSARIA LIBANOTIDELLA, Schläger.

*Alis anticis elongatis, fuscescentibus, costam versus rufescentibus, linea media dilute pulverulenta, margine postico nigro-punctato.*

Exp. al. 10—11 lin.

Head and face reddish-ochreous; palpi reddish-ochreous, second joint greyish beneath, terminal joint with a dark grey ring before the tip. Antennæ reddish-brown, with numerous short black longitudinal streaks. Anterior wings reddish-brown (darkest at the base towards the inner margin); the costa at the base broadly reddish-ochreous, beyond the middle the costal portion of the wing gradually shades off into the darker ground colour; beyond the middle is a rather sharply angulated, but not very distinct pale fascia; and some whitish scales sometimes occur on the disc; hind margin spotted with dark brown; cilia pale reddish-brown. Posterior wings pale grey, whitish towards the base, the cilia pale greyish ochreous.

Most nearly allied to *Heracliana*, but the anterior wings are much narrower, redder, and, towards the inner margin, darker. In colour it more resembles *Albipunctella* and *Chærophylli;* but the paler costa and more sharply angulated pale fascia distinguishes it from them. From *Pimpinellæ* it is distinguished by the larger size and whiter hind wings.

A specimen, taken by Mr. Turner at Newhaven, was exhibited at the September meeting of the Entomological Society. The larva feeds on *Athamanta libanotis*, in July and August.

### Coleophora Genistæ, n. sp.

*Alis anticis brunneo-ochreis, postice saturatioribus, costa* POSTICE DILATATA, *linea tenuissima plicæ, dorsoque anguste niveis; antennis albis nigro-annulatis, articulo basali incrassato, vix penicillato, grisescente.*

Exp. al. $5\frac{1}{2}$—$6\frac{1}{2}$ lin.

Head whitish-ochreous, darkest in the middle. Face and palpi whitish. Antennæ white, annulated with black, the basal joint greyish-ochreous, slightly thickened, with a few projecting scales beneath (rather more than in *Discordella*). Anterior wings brownish-ochreous, darker towards the hind margin, the space between the fold and inner margin paler; the costa white, narrowly at first but more broadly beyond the middle and continued almost to the extreme apex (thus extending much further than in *Discordella*); in the fold is a slender white streak (just similar to that in *Discordella*); and the inner margin is narrowly white (the white scales going further towards the apex than in *Discordella*); cilia brownish at the apex, shading into greyish-ochreous; hind wings pale grey, with pale grey cilia.

Distinguished from *Discordella*, which it very closely resembles, by the longer costal streak being broader beyond the middle, the white scales along the inner margin reaching further towards the apex, and the apical portion of the wing thus contracted in width being darker in colour.

The larva of this species was discovered early in May, near Newcastle, by Mr. Wailes. It feeds on the *Genista anglica*, in the leaves of which it makes white blotches; the case is formed of little bits of leaves added alternately in front and behind, and is pale greyish-ochreous. Mr. Miller subsequently met with the larva at Wanstead, and Mr. Boyd found it at Lyndhurst in the New Forest. It appears to

be common, and at the same time widely distributed, though hitherto apparently completely overlooked.

### Coleophora Inflatæ, n. sp.

*Alis anticis albis, venis tenuibus ochreis, squamis nonnullis sparsis nigris; antennis albis.*

Ep. al. $7\frac{1}{2}$—$8\frac{1}{2}$ lin.

Head, face and palpi whitish-ochreous. Antennæ white, unannulated. Anterior wings white, with slender, neat, ochreous veins, and with a few scattered black scales along the fold and on the disc. Cilia greyish-ochreous. Posterior wings grey, with greyish-ochreous cilia.

Perhaps most nearly allied to *Onosmella*, but distinguished by the broader, paler veining of the wings and the scattered black scales.

I took a specimen of this at Mickleham in July, 1855, but had not recognized it as a distinct species till Mr. Boyd bred it from larvæ, which fed on the capsules of the *Silene inflata*.

### Coleophora Virgaureæ, n. sp.

*Alis anticis angustulis albis, venis latiusculis* BRUNNEO-*ochreis, squamis sparsis saturate fuscis; antennis albis (interdum grisescente-annulatis).*

Exp. al. $5\frac{1}{2}$—$6\frac{1}{2}$ lin.

Head pale grey. Face greyish-ochreous. Palpi whitish. Antennæ white, sometimes entirely so, without annulations; sometimes faintly annulated with pale grey (but not with the annulation so dark as in *Argentula*); basal joint grey, not tufted, but rather thicker than in *Argentula*. Anterior wings rather narrow, white, with the veins broadly brownish-ochreous (thus darker than in *Argentula*); in the intervening white spaces are a few scattered dark fuscous scales. The costa is narrowly white to the middle. Cilia on the costa

whitish-ochreous, on the hind margin pale grey. Posterior wings grey, with grey cilia.

Most readily distinguished from *Argentula* by the absence of the dark costal cilia beyond a whitish line just before the apex, the *narrower anterior wings*, and paler annulations of the antennæ.

Discovered by Herr Schmid at Frankfort on the Maine in the larva state. Herr Schmid having sent me some larvæ which feed on the seeds of the golden-rod (*Solidago virgaurea*), and I have recently returned from Bideford, where that plant abounded, it occurred to me that if I could get some observant collector in the West of England to search the *Solidago*, the new species might be found here. I wrote to Mr. Parfitt, of Exeter, who had already proved himself a useful correspondent, to examine carefully the seeds of the golden-rod for this insect; he did so, and immediately found it, and from the larvæ he sent me I bred the perfect insect in August rather freely.

The case is rather small and cylindrical, as most of the cases of seed-feeding larvæ are, but it has some of the loose filaments of the seed-down woven into it, and these are fast only at the anterior end, the hinder end being loose like the quills of a porcupine.

Frey appears to have had this species before him when he described his *Albicans*, but as it does not appear to be the *Albicans* of Zeller, who makes no mention of the narrowness of the anterior wings, that name cannot be retained for it. The *Albicans* of Herrich-Schäffer feeds on *Artemisia* in a bulb-like case.

### Coleophora Vitisella, Gregson, n. sp.

This species, described by Mr. Gregson in the Zoologist, 1856, p. 5167, I have not yet had an opportunity of sufficiently examining. The female is yellower than the male, as

in *Viminetella*, *Gryphipennella*, *Siccifolia*, &c.: in the general dull glossy appearance and slenderness of the antennæ it reminds one much of *Viminetella*; but the case of the larva, not unlike a miniature case of *Anatipennella*, abundantly proves its distinctness.

The larva was found by Mr. Gregson, April the 16th, at the Brushes, near Manchester, on the *Vaccinium Vitis-Idæa*. Mr. Hague also met with it in the same locality (Intelligencer, p. 63). Professor Zeller found the larvæ near Glogau, in November, then feeding.

### Laverna conturbatella, Hübner.

(Fig. 2.)

*Alis anticis nigro-cæruleis fuscoque intermixtis, maculis duabus albis oppositis pone medium (macula costali majore ac posteriore); capite, thoraceque saturate griseis.*

Exp. al. 7—8 lin.

Head and thorax dark grey. Face pale grey, with a few darker scales. Palpi pale grey; terminal joint with two black rings, one near the base, the other before the tip. Antennæ dark grey. Anterior wings blueish-black, with some rather indistinct tawny blotches; a greyish blotch at the base of the inner, and two conspicuous white spots towards the hind margin, that on the costa the broadest and most posteriorly placed; on the fold are three tufts of black scales and three others above them; cilia brownish, frequently with a few whitish scales. Hind wings greyish-brown, with paler cilia.

Distinguished from *Propinquella*, which it most nearly resembles, by its larger size, and dark head and thorax. In *Propinquella* the head, thorax and blotch at the base of the inner margin of anterior wings are conspicuously *white*.

This species was added to our list by Mr. F. O. Standish

and Mr. Machin, who met with it on the summit of Box Hill, amongst the *Epilobium angustifolium*, which grows in the wood there.

The larva is black, and spins together the terminal leaves of the *Epilobium*, much as *Halias Clorana* does the terminal leaves of willows. (See the observations of Mr. Machin and Mr. Standish, in "Intelligencer," pp. 132, 142).

Mr. Hodgkinson finds he has a specimen of this insect, which he took two or three years ago near Preston.

### Laverna Raschkiella, Tischer.

(Fig. 3.)

*Alis anticis fuscis, violaceo-suffusis, maculis duabus (una basali dorsum versis, altera disci) flavis, macula albida costali ante apicem.*

Exp. al. 4—5 lin.

Head whitish, at the back dark grey. Face whitish. Palpi grey. Antennæ black, with a few pale annulations towards the tip. Anterior wings black, more or less blotched with orange; the orange generally assumes the form of two spots—one near the base, towards the inner margin, the other on the disc beyond the middle; nearly in the middle of the wing may be distinguished in certain lights three violet spots; and the hind margin is tinged with violet. Beyond the middle is a small whitish spot on the costa running into the second orange blotch. Cilia blackish. Posterior wings dark grey, with dark grey cilia.

Not nearly allied to any known species.

This species has also resulted from the explorations of Mr. Standish aud Mr. Machin on the summit of Box Hill; they having met with it there on the 22nd of June (Intelligencer, pp. 101, 115). Towards the end of July they discovered the larva mining the leaves of *Epilobium angustifolium*, and in August the second brood of the perfect insect.

ELACHISTA TÆNIATELLA, Zeller, n. sp.

*Alis anticis saturate fusco-nigris, postice dilutioribus et flavido-irroratis, fascia media recta latiuscula lutea; ciliis saturate griseis; capite saturate grisescente.*

Exp. al. $4\frac{1}{2}$ lin.

Head, face and palpi dark greyish-brown. Antennæ blackish, anterior wings dark brownish black at the base, the apical portion paler and irrorated with yellowish scales; nearly in the middle is a straight rather broad yellow fascia, sharply depressed on its edge, less so towards the apex; it expands a little towards the inner margin. Cilia dark grey, intersected by two darker lines. Posterior wings pale grey, with darker cilia.

The uniform dark colour of the cilia of the anterior wings, the uniform colour and breadth of the fascia, and the yellowish scales irrorated over the apical portion of the anterior wings, are characters by which this species may be at once distinguished from the other known one-banded species of the genus.

The larva which Mr. Scott found at Stockton-on-Tees feeds in the autumn, in November, in a rather coarse grass (probably *Arrhenatherum avenaceum*), in which it forms brownish mines, somewhat like those of *E. Megerlella*. The larva hybernates full fed, changing to a pupa in the spring. The perfect insect appears in April. This larva was also found by Herr Schmid at Frankfort on the Maine.

LITHOCOLLETIS TORMINELLA, Frey.

*Alis anticis dilute croceis, linea basali alba costam versus tenuiter nigro-marginata, strigulis quatuor costæ, tribus dorsi introrsum nigro-marginatis; striola apicis nigra.*

Exp. al. $3\frac{1}{2}$ lin.

Head brownish saffron. Face and palpi white. Antennæ

white (rarely with any appearance of darker annulations). Hinder tarsi whitish, spotted with dark fuscous.

Anterior wings rather pale, but bright saffron yellow (darker than in *Spinicolella* and *Faginella*, paler than in *Pomifoliella*), with pure white (not silvery white or pearly white) markings; from the base arises a slender rather short basal streak, slightly edged with black towards the costa (this dark edge is sometimes wanting); on the costa are four white spots, and on the inner margin three; the first pair of spots are less obliquely placed than in *Sorbi*, are dark margined on both sides, and the dorsal spot is broader than is usually the case in *Pomifoliella*. The black scales towards the apex form a more distinct black line than in *Pomifoliella* or *Sorbi*. A black hinder-marginal line runs through the pale saffron cilia. Hind wings grey, with grey cilia.

Best distinguished by the colour of the fore wings, and almost snow-whiteness of the markings. In 1853, I bred a specimen which, having no dark margin to the basal streak, nor the first pair of spots dark margined towards the base, had a very striking appearance.

The larva mines the underside of the leaves of *Sorbus torminalis*, and is not uncommon on two or three bushes at Lewisham. My attention was directed to it in 1853 by Dr. Jordan, but it was reserved for Professor Frey to establish its specific distinctness.

### Nepticula luteella, n. sp.

*Alis anticis saturate olivaceis, postice violaceis, fascia pone medium recta flavida, costam sæpe non attingente; capillis flavidis, brunneo-mixtis.*

Exp. al. $2\frac{1}{4}$ lin.

Head and face yellowish, more or less mixed with brown; palpi whitish; antennæ fuscous, basal joint whitish. An-

terior wings dark olive to beyond the middle; considerably beyond the middle is a nearly straight pale-yellowish fascia, broadest on the inner margin, and often not reaching to the costa; the apical portion of the wing is violet, the apical cilia pale yellowish; posterior wings grey, with paler cilia.

By the dull yellow non-metallic fascia, on the olive-coloured wings, this may be immediately distinguished from every other known species.

In June, 1852, I took several specimens of this on the Dartford Heath fence. This season Mr. Boyd has succeeded in rearing the species from one of the birch-mining larva—I believe from that larva which makes a long, not much contorted gallery, in which the black excrement forms merely a central line. Such a larva I have found at Lewisham, and not uncommonly at Mickleham, but never reared it.

### Nepticula Regiella, Frey.

*Alis anticis dilute aureo-brunneis, postice saturate purpureis cupreo-mixtis, fascia pone medium lata, orichalcea, obsoleta; capillis rufis.*

Exp. $2\frac{1}{4}$ lin.

Head and face reddish-yellow; palpi whitish; antennæ fuscous, basal joint whitish. Anterior wings pale golden-brown, tinged with purple, a broad dull golden or brassy fascia, beyond the middle not sharply defined; immediately beyond the fascia are some coppery scales in the deep purple apical portion of the wing; cilia greyish, whitish at the tips. Posterior wings grey, with paler cilia.

Distinguished from all its allies by the indistinctly margined *brassy* fascia on the pale golden brown anterior wings.

I have a specimen taken on the Dartford Heath fence

in June, 1852. It remained undeterminable as a single queer specimen, till last winter Professer Frey sent me a Zurich specimen bred from a yellow hawthorn-feeding larva. Mr. Edleston, who has lately turned his attention to this genus, has been rewarded with "beginner's luck" in breeding a specimen of *N. Regiella* from mixed leaves.

### Nepticula atricollis, n. sp.

*Alis anticis atris, fascia obliqua pone medium, in medio contracta, dorsum versus latiore, lutescenti-argentea.*

Exp. al. $2\frac{1}{4}$—$2\frac{1}{2}$ lin.

Head and face reddish-yellow; palpi whitish; antennæ fuscous, basal joint white. Anterior wings deep black; a little beyond the middle is a yellowish-silvery fascia, rather obliquely placed, often attenuated in the middle, and the inner edge of the lower half expanding more or less towards the base; cilia of the hind margin whitish. Posterior wings grey, with grey cilia.

Very closely allied to *N. angulifasciella*, but smaller, the anterior wings narrower and blacker; the silver fascia more oblique, less curved, the portion of it touching the inner margin further from the base.

This species has been bred by Mr. Boyd from wild apple and hawthorn. I met with the larva in October, 1853, and each succeeding autumn, but never succeeded in rearing a specimen; it is readily recognized by the almost black colour of the head and second segment; the mine, at first a gallery, gradually expands into a blotch.

# LEPIDOPTERA.

## RARE BRITISH SPECIES CAPTURED IN 1856.

MANY of the more important of these have already appeared in the columns of the Entomologist's Weekly Intelligencer; in such cases a reference to the page will enable the curious in such matters to refer to that journal for any more detailed account than we have room for here.

VANESSA ANTIOPA; one in the Isle of Wight in the Spring (Int. 43).

ARGYNNIS LATHONIA; one near Chesham, Bucks, the middle of August (Int. 173).

THECLA BETULÆ; appears to have been commoner than usual: several were taken at Darenth (Int. 197); and as many as forty at Henfield, Sussex (Int. 198). Mr. Crotch also found it in abundance in the valley of the Dovey, between Machynleth and Cemmaes.

THECLA W.-ALBUM; bred by the Rev. Joseph Greene, who finds it not very uncommon among elms, at Playford.

PAMPHILA ACTÆON; has been taken in numbers at its own locality—the "Burning Cliff" (Int. 154); we have since learnt that another Entomologist visited the spot the previous day to Mr. Pretor's excursion thither.

ANTHROCERA MINOS; has been taken in abundance by Mr. Birchall (Int. 114), and Mr. Wright (Sub. 11).

ACHERONTIA ATROPOS; the larva has been unusually common this autumn; there are several notices of it in the Intelligencer.

SPHINX CONVOLVULI; the occurrence of five specimens

has been recorded, at Bristol, Barnstaple, Mortlake and Peckham (Int. 186, 187, 197, and Subs. 15).

Deilephila Galii; two larvæ of this species were found near Brighton (Int. 203).

Trochilium Chrysidiforme; several specimens of this species were taken near Folkestone the middle of July (Int. 142 and 151).

Trochilium Scoliæforme; on our Plate, at figure 4, we give the promised representation of this insect. (See Ent. Ann. 1856, p. 27.)

Cerura bicuspis; Mr. Nixon bred a male of this species (Int. 62), and Mr. Scott has also bred a specimen. Mr. T. Wilkinson has obtained the larva this autumn.

Drymonia chaonia; twelve pupæ at the roots of trees in Suffolk.

Drymonia Dodonæa; upwards of 200 pupæ were obtained by digging in Suffolk by the Rev. Joseph Greene.

Lophopteryx Cucullina; a specimen of this was taken in the perfect state at Marlow (Int. 155). Most of the recent specimens have been bred from the larvæ. The Rev. Joseph Greene took 54 larvæ at Tring.

Lophopteryx Carmelita; early in May several specimens of this were taken at West Wickham Wood (Int. 44 and 61).

Petasia nubeculosa; several specimens of this insect were taken by Mr. Foxcroft at Rannoch (Int. 24, 45); at page 45 will be found rather a humorous account of the mode of capture.

Peridea trepida; the captures of two specimens have been recorded (Int. 37 and 60), at West Wickham and Horndean, but some collectors hardly view the species now as a rarity.

Orgyia gonostigma; a number of larvæ of this species

were collected near Wimbledon and Coombe Wood, and some collectors bred the insect rather freely (Int. 91 and 163).

Lasiocampa Trifolii; this has been a most abundant species in several coast localities, Eastbourne, Plymouth, New Brighton (Int. 45, 52, 77, 91, 116, 131).

Gastropacha Ilicifolia; the occurrence of five specimens at Cannoch Chase is recorded in the Intelligencer at page 67.

Endromis versicolora; six specimens were seen at Tilgate Forest last April (Int. 26), and one in a wood near Preston (Int. 28).

Drepana sicula; two specimens of this hitherto unique insect occurred in Leigh Wood, near Bristol (Int. 108, and Zoologist, 5166).

Heterogenea asellus; in the New Forest this insect *turned up* in some plenty, and two specimens were taken at Marlow (Int. 171, 189).

Cymatophora ocularis; the Rev. Joseph Greene obtained seven pupæ of this scarce species.

Diphtera Orion; has occurred in the Isle of Wight, and in the New Forest; in the latter locality in some numbers (Int. 83, 172); also in Cornwall (Int. 108).

Acronycta Alni; one at sugar near Witney (Int. 109), two near Sheffield (Int. 109), and two larvæ at Rugby (Int. 180).

Acronycta auricoma; occurred at Tenterden (Int. 83), and near Canterbury.

Synia musculosa; two specimens have occurred at Brighton (Int. 154, 173).

Xylomyges conspicillaris; has been taken near Worcester (Int. 20 and 83); also at Darenth Wood (Int. 51 and 76).

Laphygma exigua (Fig. 6); specimens of this insect

have been taken by Mr. Henry Cooke at Worthing (Int. 173), and Mr. Wallace in the Isle of Wight (Int. 183). Mr. Wallace's specimen, a female, kindly laid some eggs, the larvæ from which having fed up duly changed to pupæ, and three specimens of the perfect insect have already made their appearance.

Heliophobus hispida; a specimen was taken near Plymouth in September, by Mr. Rogers.

Mamestra abjecta; two specimens were taken at Holywell by Mr. Archer, one at sugar, the other at light.

Miana expolita; has again occurred near Darlington (Int. 139).

Agrotis saucia; unusually common this autumn; no less than fifty specimens were taken in the Isle of Wight, by one collector: it has also occurred freely at Deal, and has been taken at Plymouth and other places on the south coast.

Agrotis lunigera; this has been no great rarity in the Isle of Wight, at sugar.

Agrotis obelisca; several have been taken at sugar in the Isle of Wight.

Agrotis Ashworthii; has been taken rather freely in North Wales (Int. 125).

Noctua ditrapezium; six very fine specimens were taken by Mr. Bond, near Blandford, in July.

Tæniocampa leucographa; occurred near Marlow in April (Int. 12), also at Darenth Wood (Int. 11) and East Grinstead (Int. 28).

Dasycampa rubiginea; a few hybernated specimens were taken at Exeter and Plymouth, in April (Int. 11, 15); in the autumn a specimen occurred at Marlow.

Cirrædia xerampelina; at the end of August, the Rev. Joseph Greene obtained forty-six pupæ at the roots of ash trees.

CRYMODES TEMPLI; four have been taken on gaslights at Plymouth. In 1823, this insect was taken in Devonshire by Captain Blomer.

CUCULLIA GNAPHALII; Mr. Hawker has met with the larva of this rare species at Horndean (Int. 155).

CUCULLIA CHAMOMILLÆ; has been taken at Dunbar and at Plymouth not uncommonly (Int. 61, 142).

HELIOTHIS ARMIGERA; a specimen of this rare *Noctua* was taken about the middle of August by Mr. Parfitt, at Exeter; one was also taken by Mr. Dutton in the Isle of Wight (Int. 183).

ENNOMOS ILLUSTRARIA; appears now to have become almost a common insect (Int. 26, 36, 44, 62, 76, 115, 142).

ENNOMOS ALNIARIA; a third British specimen has been taken at Margate (Int. 13).

MACARIA NOTATARIA; this species appears to have been commoner than usual, though the supply of wings seems to have been deficient, many having only three (Int. 76, 124, 132, 151, 163).

EUPISTERIA CARBONARIA; was taken on Engleborough in Lancashire by Mr. Gregson (Int. 44); all the previous captures were from Scotland.

SPERANZA CONSPICUARIA; has occurred at Stowmarket but less plentifully than usual (Int. 67).

COREMIA LIGUSTRARIA; very common in hawthorn hedges at Playford, near Ipswich.

PHIBALAPTERYX GEMMARIA; the capture of a specimen of this insect, in the Isle of Wight, fell to the lot of Mr. Wallace (Int. 187).

EUCOSMIA UNDULARIA; a specimen was taken by the Rev. Mr. Horton in Cornwall (Int. 108).

CABERA ROTUNDARIA; a fine series of this species has been bred by Mr. F. O. Standish (Int. 142).

ALEUCIS PICTARIA; was taken on the Dartford Heath fence as usual (Int. 11, 43, 46).

EUPITHECIA SUCCENTURIATA; has been taken and bred in some numbers by the Lancashire and Scotch collectors; there seems now no longer room to doubt but that *Subfulvata*, *succenturiata* and *cognata* are varieties of one species.

EUPITHECIA CONSIGNATA; a specimen was taken in Suffolk this spring (Int. 43).

ACIDALIA PEROCHRARIA; was taken by Mr. Harding, at Deal (Int. 109).

ACIDALIA INORNARIA; Mr. Bond met with several specimens of this near Blandford.

RHODARIA SANGUINALIS; this still continues to be taken on the Cheshire sand hills (Int. 99).

ODONTIA DENTALIS; has occurred again rather freely at Brighton (Int. 116, 134).

PIONEA STRAMENTALIS; this has again been plentiful at Shrawley Wood, near Worcester, and has also been taken at Pembury, by Mr. Weir (Int. 124).

SPILODES PALEALIS; a specimen of this insect was taken by Mr. Hunter, at Folkestone, in July (Int. 142).

SPILODES SILACEALIS; three specimens were taken by Mr. Wallace, on Culver Cliffs, Sandown, Isle of Wight.

BOTYS TERREALIS; has again been taken rather freely in North Wales (Int. 115), and has likewise been bred by Mr. Almond (Int. 133).

BOTYS DECREPITALIS; has again been taken by Mr. Buxton, in Ross-shire (Int. 100).

BOTYS LANCEALIS; taken by the Rev. Mr. Hawker (Int. 107), and by Mr. Harding (Int. 116), and by Mr. Weir (Int. 124).

EPISCHNIA DIVERSALIS; a specimen, taken by Mr. Hut-

ton at Hurstperpoint, was exhibited at the April meeting of the Entomological Society (Int. 7).

SIMAETHIS SCINTILLULALIS; this insect has been bred by Mr. Vaughan, and has also been taken plentifully at Preston, by Mr. Hodgkinson (Int. 166).

AMPHYSA PRODROMANA; this occurred rather freely in April, at the Brushes, near Manchester (Int. 27).

ŒNECTRA PILLERIANA; Mr. Buxton has obtained a fine series of this insect from the Isle of Wight.

SPILONOTA PAUPERANA; this has again been taken in April, in lanes, near Darenth Wood.

SPILONOTA NEGLECTANA; this insect, which is much overlooked or *neglected*, has been taken freely near Camberwell, by Mr. Wildman (Int. 61).

MIXODIA HAWKERANA (Fig. 5); this has again been taken by Mr. Bond.

PHOXOPTERYX UPUPANA; a specimen was taken at West Wickham by Mr. Wildman (Int. 83), at the end of May, and Mr. Machin also met with this insect in the same locality. early in June (Int. 90).

PHLÆODES CRENANA; several specimens of this insect were taken by Mr. Wilkinson of Scarborough, who writes—"I took them in March and April last on Seamer Moor, two miles west of this place; they were freely on the wing in fine sunny mornings from ten to one amongst heather, stunted oaks, birches, sallows, nut bushes and furze bushes; they seemed to frequent the sallows the most." Madame Lienig says (Isis, 1846, p. 236), "it flies fresh in April, July and September. The larva is whitish or pale green, the head pale brown; it feeds on sallows and willows; the perfect insect in the day time is generally found sitting on walls."

HEUSIMENE FIMBRIANA; this has been taken in some

plenty in the neighbourhood of Manchester (Int. 17, 28); it also occurred at Darenth Wood (Int. 26).

RETINIA SYLVESTRANA; this species has been bred in some numbers by Mr. Machin and Mr. F. O. Standish, from the young shoots of the stone pine (*Pinus pinea*) (Int. 133, 142).

ARGYROLEPIA MARITIMANA; Mr. Harding has again taken this insect at Deal (Int. 91); M. Guenée doubts this being identical with his *Maritimana*, and believes there are several allied species attached to the *Eryngium*.

# OBSERVATIONS ON BRITISH TINEINA.

(Supplementary to the Insecta Britannica—Lepidoptera, Tineina; and the Entomologist's Companion, 2nd Edition.)

*Exapate gelatella*, I. B., p. 12. Mr. T. Wilkinson met the larva of this species between united leaves of willow in July, 1850, near Bristol.

*Tinea rusticella*, I. B., p. 27. "The larva," writes Mr. T. Wilkinson, "feeds on old carpet as well as rotten wood. In a cellar I found a piece of half-rotten carpet, on which a great many moths were sitting, some of them just in the act of drying their wings, and scores of empty pupa-cases protruding from the old carpet."

*Tinea fulvimitrella*, I. B., p. 27. Mr. Edleston says of this, "the larva feeds under the dead bark of beech and oak, round the hole where the 'frass' comes out."

*Tinea corticella*, I. B., p. 30. Mr. Edleston finds the larva of this species under the bark in dead oaks, and also in the rotten wood when the bark is taken off.

*Tinea Caprimulgella*, I. B., p. 32. Of this rare species Mr. Tompkins met with a specimen on an oak tree in Hyde Park, at the end of June (Int. 156).

*Tinea misella*, I. B., p. 33. Of this Mr. C. S. Gregson writes, "I have bred it from unthrashed wheat this year; it made up in the head and fed upon the grain. I formerly bred it from the interior of bean stalks, for seeing the pupa-

cases projecting from the stalks, I split up several stems and so found the larva."

*Tinea pallescentella*, I. B., p. 34. This has occurred in some plenty at Liverpool; the larva is granivorous. I give here a more complete description than I was formerly able to give.

Exp. al. 7—10 lin.

Head greyish-ochreous, with a few brown hairs in the centre. Anterior wings shining, pale greyish-ochreous, with a conspicuous blackish streak along the fold, reaching to the middle (sometimes interrupted near the base); on the disc beyond the middle are two blackish spots, surrounded, or at least followed by some paler ochreous scales; hind margin more or less spotted with dark fuscous; cilia pale greyish-ochreous. Posterior wings whitish grey, with whitish ochreous cilia.

*Tinea semifulvella*, I. B., p. 35. Mr. Gregson has bred this from birds' nests.

*Tinea bistrigella*, I. B., p. 35. This insect has been bred by Mr. Logan, and is the solution of Enigma No. 21 (Ent. Annual, 1856, p. 63). The discovery of the habit of the larva of this species by Mr. Boyd is one of the most important additions to our knowledge we have lately had to chronicle. The larva mines the leaves of the birch in July and August, at first in excessively slender galleries, which almost invariably commence near the tip of the leaf, run nearly parallel to and very near the mid rib to the base of the leaf, then turn off to one side, where at length the larva commences making a large blotch, in which it eventually cuts out an elliptical case, and descends to the ground, but does not eat any more. The perfect insect appears the following May or June (Int. 110, 125).

*Lamprosetia Verhuellella*, I. B., p. 39. I have received the larva of this species from Mr. Drane, who found it on

the ruins of Caerphilly, and from Mr. Bostock, who found it at Bideford (Int. 7). The perfect insect was met with in Wales by Mr. Gregson (Int. 115).

*Micropteryx Allionella*, I. B., p. 43. Mr. Edleston says he has seen many hundred specimens invariably among *Vaccinium Myrtillus*, flying over and sitting on that plant.

*Micropteryx unimaculella*, I. B., p. 45. Mr. Gregson bred this species from green pupæ found in small mines in the lichen and bark of birches (Int. 28, 29). This indication of where the pupæ should be looked for may lead to the detection of the larva.

*Scythropia Cratægella*, I. B., p. 57. I met with a nest of this species in June. The pupa is suspended quite exposed in the common web, and is unusually angular.

*Hyponomeuta vigintipunctatus*, I. B., p. 59. Two or three specimens of the perfect insect were taken at Guildford by the Rev. P. H. Newnham (Int. 67, 174), and in October he found two broods of the larva on the orpine (*Sedum Telephium*).

*Anesychia funerella*, I. B., p. 63. I have long suspected from its habitats this must feed upon the Comfrey (*Symphytum officinale*), and I have lately heard from Professor Frey, that, in the continuation of Sepp's work, the larva is figured on that plant. Professor Frey found it near Zurich on *Lithospersmum officinale*, along with the larva of *A. decemguttella*.

*Plutella annulatella*, I. B., p. 68. Mr. Wailes has met with this near Newcastle, and Mr. Wilkinson near Scarborough (Int. 174, 187).

*Cerostoma horridella*, I. B., p. 72. Herr Bremi, of Zurich, has found the larva on apple-trees.

*Semioscopis Steinkellneriana*, I. B., p. 79. Mr. Harding observes (Int. 26), that this flies from daybreak to sunrise.

*Depressaria arenella*, I. B., p. 87. I fancy this larva feeds on many of the Compositæ; Mr. Harding found it at Deal on burdock (*Arctium Lappa*), and I have seen leaves of *Serratula tinctoria* apparently operated on by this insect.

*Depressaria purpurea*, I. B., p. 89. Professor Frey informs us that the larva of this species has been found by Herr Bremi on *Torilis Anthriscus*.

*Depressaria Pimpinellæ*, I. B., p. 95. This has been taken in Dorsetshire by Mr. Tompkins, and near Plymouth by Mr. Reading, by beating thatch.

*Depressaria nervosa*, I. B., p. 98. Mr. Tompkins has obtained, from thatch in Dorsetshire, some very dark specimens (almost black) of this insect; *if* indeed they be strictly referable to it.

*Gelechia terrella*, I. B., p. 113. Mr. Scott has had this out in a breeding-cage, in which he had a bunch of rushes, so *supposes* the larva lived in the moss around the roots (Int. 147).

*Gelechia Viscariella*, Logan (E. A. 1855, p. 43; 2nd edit., p. 65; 1st Annual Supp. to I. B., p. 2). Mr. Wilkinson has bred what is probably this species from larvæ found in the shoots of *Lychnis dioica*, near Scarborough.

*Gelechia tæniolella*, I. B., p. 132. I have now bred this from a greenish-yellow and red-banded larva feeding between united leaves of *Lotus corniculatus*. I found it at Mickleham, the middle of June.

*Gelechia Sircomella*, I. B., p. 132. Mr. Wilkinson has taken this, in company with *G. tæniolella*, flying over clover; Mr. Thompson has also met with it at Crewe.

*Gelechia nigricostella*, I. B., p. 135. I have bred this from a pale green larva, with small black spots, feeding on *Medicago sativa*, which I received from Herr Schmid (Int. 45).

*Gelechia paupella*, I. B., p. 138. Mr. Douglas has bred several specimens *apparently* of this species from larvæ found in the flowers of *Inula dysenterica* (Int. 172). It becomes a question for future solution, whether *Paupella* be not the summer brood of *Inopella*.

*Cleodora striatella* (E. A. 1856, p. 36). A second specimen of this insect has occurred; it was taken by Mr. Cooke near Brighton.

*Anarsia Spartiella*, I. B., p. 144. I have bred this from brown larvæ in the shoots of furze, sent me by Mr. Boyd.

*Hypercallia Christiernana*, I. B., p. 153. The discovery of the larva on the leaves of *Polygala Chamæbuxus* by Professor Frey is recorded in the Intelligencer, p. 100.

*Röslerstammia Erxlebella*, I. B., p. 172. Some years ago Mr. T. Wilkinson found this in plenty at the end of May and beginning of June, in Leigh Wood near Bristol, on the leaves of some *lime* trees; frequently *in copulâ* on the leaves, also freely on the wing. Mr. Wilkinson is inclined to think there is a second brood towards the end of August and beginning of September, but not nearly so numerous as in May, and rarely met with except by beating.

Mr. Weir suggests we have two species mixed under this name, one feeding on heath and the other on lime.

*Douglasia Ocnerostomella*, I. B., p. 180. The following extract from a note from Mr. Winter affords a clue to the natural history of this species: "Some months since"—this was written in July,—"my friend Mr. Mitton of Hurstperpoint told me that he had discovered some minute larvæ *in the dead stems* of *Echium vulgare*, and that he had bred from them some small moths, which I felt no doubt were *D. Ocnerostomella*. I therefore collected some stems, but searched in vain for the larvæ. I kept them, however, in a glass jar, and several specimens of *Ocnerostomella* have just

made their appearance. I may mention, that I obtained several *case-bearing* larvæ from the same stems, but they all died."

*Argyresthia glaucinella*, I. B., p. 185. "The larvæ of this species," writes Mr. Edleston in the Intelligencer, "feed under the bark of oak and Spanish chesnut; they are excessively local, and only found at the base of trees of enormous size."

*Cedestis farinatella*, I. B., p. 190. Mr. T. Wilkinson met with the larvæ of this in March mining the leaves of *Pinus sylvestris*. The larva is shining pale brown, with dull green dorsal vessel. It mines from the tip of the leaf downwards, leaving the mined portion full of excrement.

*Ocnerostoma piniariella*, I. B., p. 191. The larva of this is brown, and it mines the leaves of *Pinus sylvestris* in March, working from the tip downwards; but thongh it leaves the end of the leaf full of excrement, some distance from the tip it makes a hole, and ejects its excrement through it, so that the lower half of the mine is tolerably empty and appears whitish.

*Zelleria hepariella*, I. B., p. 192. Mr. Wilkinson says, "I first met with this by beating *yew* trees in September." Mr. Gregson met with it in a *yew* wood near Conway (*Gracilaria Haighii*, Zoologist, 5295); and I have myself seen it beaten from a *yew* tree at Mickleham.

*Gracilaria semifascia*, I. B., p. 196. Mr. Ashworth has bred this species from larvæ making cones on the leaves of *maple*.

*Gracilaria omissella*, I. B., p. 198. I found the larvæ of this species abundant at Reigate in September; Mr. Winter also met with it at Brighton.

*Ornix Loganella*, I. B., p. 207. Mr. T. Wilkinson has

bred this species at Scarborough from mountain-ash (Int. 7).

*Coleophora Wockeella*, I. B., p. 212. Mr. Bond met with several larvæ in a little wood near Canterbury in April, on *Betonica officinalis* (Int. 46).

*Coleophora murinipennella*, I. B., p. 218. At two separate times has Mr. Scott sent me a peculiar vandyked case; on one occasion it was on the seeds of *Luzula*. My last letter from Professor Zeller contained the gratifying information that "the larva of *C. murinipennella* feeds on the seeds of *Luzula pilosa;* next year I can send it you."

*Coleophora conspicuella*, I. B., p. 213. Three or four specimens of this were taken in Headley Lane this summer by Mr. Machin, Mr. Standish, Mr. Tompkins.

*Coleophora orbitella*, J. B. p. 221. Mr. Edleston has two specimens of this species, beat from a birch, June 29th, near Bowden, Cheshire; and Mr. Ashworth has bred it from a case found on the trunk of a birch tree.

*Chauliodus Illigerellus*, I. B., p. 234. Mr. Drane found the leaves of the *Œgopodium podagraria* "crumpled" by the larvæ in a wood near Cardiff. He was too late for the larvæ; he sent me a solitary one, from which I bred an Ichneumon.

*Laverna propinquella*, I. B., p. 236. Mr. T. Wilkinson writes, "I have bred a number of this either from *Epilobium hirsutum* or *alsinifolium*, but how it mined I cannot say at present. The perfect insect is now (July 28) very common on the flowers of ragwort."

*Laverna ochraceella*, I. B., p. 238. The larva mines the stems of the *Epilobium hirsutum*. Mr. T. Wilkinson says "it begins to mine from the root of the plant in the spring, as soon as the plant begins to shoot. I first found the larvæ the second week in May last, then very young."

*Chrysoclista bimaculella*, I. B., p. 242. A specimen was taken by F. O. Standish in 1855, on Leith Hill, among sallows.

*Asychna terminella*, I. B., p. 246. This has now been bred from the larva making spiral mines in the leaves of *Circæa lutetiana* (Int. 94, 101).

How extraordinary that we should be acquainted with the larva of this rarity, before we know that of the common *Asychna modestella!*

*Elachista Pfeifferella*, I. B., p. 250. The larva makes blotches in the leaves of dogwood, similar to that of *E. Treitschkiella*, but, as might be expected, the larva and blotch are both larger; besides the head and second segment are *pale brown* in *Pfeifferella*, black in *Treitschkiella;* the latter has also a row of black spots beneath, which are wanting in *Pfeifferella*.

The case is perhaps a trifle larger.

*Elachista consortella*, I. B., p. 256. This pretty species is not uncommon in Headley Lane in June, but very lively and not easily boxed.

*Elachista Bedellella*, I. B., p. 257. The larva mines in March and April the tips of the leaves of *Avena pratensis;* the upper cuticle becomes conspicuously whitish, the tip itself dull pink. It is common on Box Hill.

*Elachista adscitella*, I. B., p. 259. Of this *E. abruptella* I. B., p. 258, is the female. The larva discovered by Mr. Scott, near Stockton, mines the leaves of *Sesleria cærulea*, making very white mines.

*Elachista pollinariella*, I. B., 261. This has been bred by Mr. T. Wilkinson, but the larva was not distinguished at the time.

*Elachista ochreella*, I. B., p. 262. Mr. Machin met with this at West Wickham, Mr. Weir at Pembury and Mr.

Hodgkinson at Preston (Int. 91, 99 and 101). Hence it seems widely distributed.

*Elachista cygnipennella*, I. B., p. 263. As an instance of the difficulties of the Entomological student, I may observe that Mr. Scott sent me this larva mining in six different grasses, and *E. albifrontella* was mining in the same six grasses at the same time.

*Lithocolletis hortella*, I. B., p. 267. Several have been taken by Rev. P. H. Newnham at Guildford.

*Lithocolletis Amyotella*, I. B., p. 267. Mr. T. Wilkinson bred this freely from oak leaves.

*Lithocolletis quinqueguttella*, I. B., p. 268. Mr. Gregson has bred this from sallow-feeding larvæ, which he collected last autumn from the small sallows on the sand hills.

*Lithocolletis irradiella*, I. B., p. 269. Mr. T. Wilkinson has bred several of this species.

*Bucculatrix cidarella*, I. B., p. 291. Among alders this seems generally abundant. Mr. T. Wilkinson has taken it freely at Scarborough; and at Reigate I found the marks where the larvæ had been (for I was too late for them) very plentiful.

*Bucculatrix Demaryella*, I. B., p. 292. Mr. T. Wilkinson discovered the larva of this feeding on birch (Int. 171).

*Bucculatrix maritima*, I. B., p. 293. Mr. Hemmings has discovered the larva of this species feeding in May on *Aster tripolium*.

*Bucculatrix Hippocastanella*, I. B., p. 294. Mr. Ashworth met with the larva of this species on a lime tree at Llangollen (Int. 172).

*Nepticula Headleyella*, I. B., p. 300. Mr. Tompkins took a specimen of this in Headley Lane, June 8th; and I met with two there on the 23rd June.

*Nepticula cryptella*, Ent. Ann. 1856, p. 41. This is

the solution of Enigma No. 16. I took two specimens in Headley Lane, June 23rd; and the middle of July I found the Lotus-mining larvæ freely; none of these have yet produced moths; yet as Frey gives September and October as the time for the larvæ, there ought to be an August brood of the imago.

*Nepticula argentipedella*, I. B., p. 303. This is the solution of Enigma No. 10, I having bred two specimens from the birch leaves sent me last autumn by Mr. Wilkinson.

*Nepticula Alnetella*, Ent. Ann. 1856, p. 43. I found the larvæ of this not uncommon on Reigate Heath in September, and plentiful near Beckenham in October.

It has been suggested to me that there are two species of *Nepticula* mining in alder leaves.

# ANSWERS TO ENIGMAS.

Answers to Enigmas in the Entomologist's Annual, 1855, 1st Edition, p. 63; 2nd Edition, p. 85.

1. *Asychna terminella;* see ante, p. 128. Last year we indicated as the *probable* solution of this enigma *Anybia langiella.*

5. *Nepticula arcuata*, Frey. This has not yet been bred in this country, though the larva has again been met with. The perfect insect is allied to *Angulifasciella.*

6. *Phoxopteryx Lundana.* This has been bred both by Herr Schmid and myself.

7. Not yet solved.

8. *Nepticula atricollis;* see ante, p. 112.

10. *Nepticula argentipedella;* see ante, p. 130.

11. Not yet solved.

16. *Nepticula cryptella*; see ante, p. 129. This had been bred by Professor Frey; I have not been equally fortunate.

Answers to Enigmas in the Entomologist's Annual, 1856, p. 63.

18. Not yet solved.

19. *Coleophora Inflatæ;* see ante, p. 105.

20. Not yet solved.

21. *Tinea bistrigella;* see ante, p. 122.

22. Not yet solved.

23. *Elachista tæniatella;* see ante, p. 109.

24. *Coleophora Virgaureæ;* see ante, p. 105.

## ENIGMAS STILL UNANSWERED.

7. "A *Gelechia?* larva on oak, forming an entire leaf into a vaulted chamber." Is not this *Phoxopteryx subuncana?*

11. "An *Elachista* larva, found by Mr. Scott at the end of April, mining in leaves of *Scirpus lacustris.*" This has not again been met with.

18. "A *Lithocolletis* larva mining the upper side of birch leaves." This has not again been met with.

20. "A *Depressaria* larva found by Mr. Boyd, May 2nd, 1855 (it was then young), feeding on a leaf of parsnip (*Pastinaca sativa*) under a turned-down corner; this was expected to be *Depressaria Douglasella.*" It has not again been met with.

22. "A singular mine on alder leaves." These I have collected rather freely this year, so hope to solve the difficulty next season. The habit of this larva is so very peculiar that it deserves special notice. The larva commences to mine near the midrib, and mines *along* a lateral rib for a short distance; it then crosses over from one lateral rib to another, and in so doing makes a very slight but visible track. This is the track to be looked for when collecting the larva; for, as soon as it reaches the next lateral rib, it mines along it to the midrib, and then mines down the midrib for an inch or more, all which time the larva and track are both completely concealed in the thickness of the rib; the larva then turns round and mines up the midrib to about the place

where it had entered it; there it quits the shelter of the rib, and makes a broad flat mine in the leaf, and, as soon as this mine is big enough, it cuts out an oval case like *Tinea bistrigella*, and descends to the ground. But in the alder feeder the blotch, being so much smaller, is all or nearly all used up to form the case; so that in the deserted leaves we see the hole, and the track between the two lateral ribs, but nothing more. If there is no hole, but yet this tell-tale track, the larva, though completely invisible, is still within the leaf!

## NEW ENIGMAS FOR SOLUTION.

25. A *Nepticula* larva mining the leaves of *Vaccinium Myrtillus* in October and November. The mine is rather broad and considerably contorted. The larva when full fed quits the leaf. I first received this from Herr Schmid of Frankfort, and a few weeks afterwards Mr. Edleston sent it me from the neighbourhood of Manchester.

26. A *Nepticula* larva mining the leaves of birch; the mine has some resemblance to that of *Nep. luteella*, but the central track of excrement is broader, not so mathematically linear. "Mine contorted, at first nearly filled up with black excrement, then with a broadish central track of dark green excrement, leaving a whitish margin on each side."

27. A *Gelechia?* larva feeding in the heads of yarrow (*Achillea millefolium*) among the seeds. I met with this

some years ago in Devonshire, and last year Mr. Parfitt found it; this autumn it was sent me from Reigate by Mr. Jeffrey.

28. A *Coleophora* larva with a case similar to that of *limosipennella*, feeding on birch. I have found this at Lewisham, and have also received it from Mr. Tress Beale at Tenterden, and Mr. Weir at Pembury.

29. A *Coleophora* larva with a case similar to that o *siccifolia*, feeding on birch. This I also received from Mr. Tress Beale at Tenterden.

THE FOLLOWING HAVE NOT YET BEEN FOUND IN THIS COUNTRY, BUT ARE STILL UNSOLVED PROBLEMS IN NATURAL SCIENCE.

30. An *Adela?* larva in a flattish case formed of pieces successively added at one end. These were found by Herr Schmid at Frankfort, in March and April, and fed indifferently on sloe, chickweed, or almost any thing green. They climbed up the twigs of sloe I gave them, without difficulty, and nibbled off the just expanding buds. "Can an oyster climb a tree?"

31. A *Coleophora* larva feeding on *Vaccinium Myrtillus* in a longish slender case *somewhat* like that of *Viminetella*, found by Herr Schmid at Frankfort, the middle of October. I believe I found one of the same kind in May, 1855, in the Stadtwald at Glogau; hence the feeding larvæ may be sought for and collected next spring.

32. A *Coleophora* larva found by Herr Mühlig feeding on the seeds of *Artemisia vulgaris* at the end of September; the case shaped like a withered flower.

# HOW INSECTS BREATHE.

By John Lubbock, F.G.S.

Few people could describe with accuracy the internal anatomy of insects. We all know that they eat, run, and see, and that many of them fly; but how they perform these actions few even among Entomologists care to know. And yet this indifference cannot be ascribed to the nature of the subject itself; for though the inner organs cannot for an instant vie in brilliancy of colour with those that are more exposed to the light, they will be found noways inferior in beauty of form, in delicacy of structure, or in the lessons which they teach us of the power and goodness of the Creator. The absence of all disagreeable smells and of red blood, as well as the few instruments that are necessary (for a small microscope, a trough of water for the object, a pair of fine scissors and some needles stuck in handles are quite sufficient), make insects very favourable subjects for those who wish to examine that most wonderful of all machines—an animal. We must indeed expect that collecting, and the pleasant walks in the country which it involves, when not an hour passes without some tangible result, will always be more popular than the sedentary studies of the anatomist; but the great disproportion which appears to exist at present between these two classes of Entomologists, cannot be in this way entirely accounted

for. It is probably in part owing to the want of popular works on anatomy. At present the young Entomologist, who wished to know something more about the structure of the insects which he collects, than their outer form and colours, would probably, unless some one was near to inform him, have great difficulty in obtaining any suitable book; and if, without profiting by the experience of his predecessors and trusting boldly to his own exertions, he endeavoured to solve the question for himself, he would, when he had removed the skin of any insect he might choose as most suitable for his purpose, find before him an intricate and apparently confused labyrinth of nerves, tubes and vessels—a sort of Gordian knot, more easy, alas, to cut and spoil, than to unravel; a little microcosm, showing, as has been said of our earth itself—"no trace of a beginning, no sign of an end."

If, however, the insect be fresh, one set of tubes, distinguished by a silvery white colour, will be seen running over and among the other organs, like the roots of a tree in the earth; these are the tracheæ or air tubes, part of the breathing organs, of which it is my object here to give a short account. I shall not attempt to describe these organs in detail, but shall only notice them very briefly, and then point out some of the chief differences, and especially such as bear reference to the habits of the insect. For convenience of description we may divide the respiratory organs of insects into two parts, the spiracles or breathing holes, and the tracheæ or air tubes.*

The body of an insect consists of thirteen rings. The first forms the head; the next three are called the prothorax,

* The most complete account hitherto given of these organs is in Burmeister's Handbook of Entomology, which was translated by Shuckard in 1836, and in which will be found references to the earlier works on the subject.

mesothorax and metathorax; they carry the three pairs of legs, and, in the case of the two latter, also the wings, and are in the perfect insect more or less intimately connected together, forming a sort of strong box called the thorax. The remaining nine rings form the abdomen, but are very seldom all of them developed.

The normal situation of the spiracles is on the membrane connecting together each pair of segments, except the first and last. There are, therefore, never more, and very often less, than ten pairs, depending on the number of developed abdominal segments.

In a great many cases, however, the spiracles are situated not on the connecting membrane but on the segments themselves. In the silk worm, for instance, or the large caterpillar of the Goat moth, in which the spiracles can be seen as a row of nine dots on each side of the body, the spiracles which, according to the above rule, should be between the pro and mesothorax, are on the prothorax, while those which we should expect to find between the metathorax and first abdominal segment are carried back to the first abdominal segment and so on with the posterior spiracles. We cannot, however, at present account for these slight variations of position, and this is not the place to describe them in detail.

In the human throat there is a contrivance by which foreign substances are prevented from passing down the windpipe into the lungs; it is simply that the windpipe is smaller during expiration than in inspiration, the current of air rushes out with greater velocity than it entered, and of course carries out with it anything that may have got in accidentally:* in insects there is no such contrivance. The reason of this difference is obvious. Suppose in man, for instance, we had a complicated apparatus to prevent any of the food from entering the windpipe, but no means for

* Sir C. Bell, Phil. Trans. 1832.

removing it when once there; it could hardly fail, in the lapse of time, that something would accidentally enter, which would afterwards prove a constant source of annoyance. But insects cast their skin at short intervals, at least as long as they are larvæ, and but few live more than a few weeks in the perfect state; and as the larger tracheæ are cast with the skin, it is sufficient to take precautions to prevent anything from penetrating through the spiracle.

In most cases the spiracle is a slit which can be closed, and muscles are provided for the purpose; sometimes instead of one hole there are a number, separated by a horny net-work. These are found in the larva of *Sirex duplex*, and may perhaps be required, because these larvæ live in galleries which they eat in trees, and the wood dust would be very apt to penetrate an ordinary spiracle. In the large water-beetle (*Dyticus*), and in *Cicada*, bushy hairs project from the margin, and the air being thus strained, all extraneous matters are effectually excluded. The spiracles lead into tubes called tracheæ, which in the live insect are constantly full of air. From each spiracle these tubes ramify in all directions, like the roots of a tree, dividing and subdividing until their final branches become so small as to be scarcely discernible. Besides these branching tubes, each spiracle sends a large unbranched one to the tracheæ arising from the spiracles on each side. In this manner the whole body is connected into one system; but for this contrivance, if any one spiracle became stopped up, the organs in its neighbourhood would suffer from want of air.

Besides the tracheæ we find also, in a great many cases, air bladders or vessels; these serve as receptacles of air, and probably assist in giving to the body that lightness which is necessary for flight: in this respect we may compare them to the air vessels which are found in birds; and we shall ob-

serve, as favourable to this hypothesis, that they are particularly developed in certain flies (*Volucella*) and other insects which fly much, and on the other hand that they are absent in all caterpillars and maggots.

Turning now to the mechanism by which the renewal of the air is effected, it will be sufficient to state with regard to the expiration that it appears to be caused by the action of certain muscles which compress the general cavity of the body. This must be materially assisted by the presence of the air-sacks mentioned above, which accordingly are found in those insects which, from their great powers of movement, require a large supply of oxygen.

On the other hand, the inspiration is no doubt caused by the general elasticity of the hard insect skin, assisted by that of the tracheæ. If these organs were formed like other tubes of the animal body, of a simple membranous skin, it would be difficult to imagine in what way when once emptied of air they could ever be refilled. The same plan is however adopted here as in our throats; namely, the introduction of cartilaginous elastic substance, which in mankind is developed in the form of rings, as we must all be aware, but in insects is a thread wound round and round inside the outer membranous tube of the tracheæ.

If we compare this type of the respiratory organs, which is found so far as we know the same in essential points in all perfect insects, except *Pteronarcys*, which has branchiæ as well as spiracles, and in most larvæ, with that which prevails in the *Vertebrata*, or animals with bones, we are at once struck with the fact that in insects the air never enters the body through the mouth, although in a few cases (the larvæ of *Libellula*) the opposite end of the intestinal canal is used for that purpose; and secondly, that the air vessels are not col-

lected into one mass called the lungs, but are scattered throughout the whole body.

The cause for this dispersion we may probably find in the imperfect circulation of the blood; in the *Mammalia*, care has been taken that all the blood should be subjected at very short intervals to the action of the air, and though in the reptiles this is not the case, yet even here a part of the blood thus aërated is carefully mixed with the remainder, which has not been so purified.

But in insects the organs for the circulation of the blood appear much less developed, and though very likely future anatomists may discover far more than we are at present aware of, yet we may perhaps conclude, that, if the blood was aërated in one part only of its course, a large portion would remain without this necessary purification.

As insects never breathe through their mouth, they have of course no voice properly so called, and when they make a noise it is in some different manner, and is usually caused, like the so-called chirping of the cricket and grasshopper, by the rubbing of one part of the body against another. The humming of the bumble bees, blue bottles, &c., forms however, to a certain extent, an exception to this rule, although for this sound three causes have been suggested.

Chabrier (Essai sur le Vol des Insectes, Ann. du Musée, 1820, vol. vi. p. 456), speaking of the blue bottles, observes, that the metathoracic spiracles are covered by several little scales, which are of the colour of the skin, and are fit to give extension and continuity to the sound by their vibrations or their resonance; and if they are removed with care, the insect can still fly, but can scarcely be heard. Burmeister, however, Manual of Entomology, p. 468, says, "If the wings be cut off, the fly produces its former sound, although somewhat weaker . . . . If the *scales be removed, the sound is*

*not at all affected;* it remains unchanged as long as the wings can vibrate. If the poisers, lastly, be cut off, this produces no difference of sound . . . . The spiracle alone remains therefore to be considered as the cause and instrument of the sound." Following up these experiments Dr. Burmeister dissected the spiracle, and found that the posterior lip is formed into a small, flat, halfmoon-shaped plate: "upon this plate (lo. cit., p. 469) there are nine parallel very delicate horny leaves, the superior free sharp edges of which are bent somewhat downward." . . . "Upon the air, which is driven with force out of the tracheæ, touching these laminæ, they are made to vibrate, and sound precisely in the same manner as the vibrating of the glottis of the larynx."

Kirby and Spence appear only to have seen some extracts from Chabrier's interesting paper (see Kirby and Spence's Edition, 1856, p. 488), and say, "after all the friction of the base of the wings against the thorax seems to be the sole cause of the alarming buzz of the gnat as well as that of other *Diptera*."

Yet I cannot but think that Chabrier and Burmeister have conclusively shown these sounds to be connected with the rushing of the air from the spiracles, and therefore entitled to some extent to the name of voice.

The short description which I have given above applies in essentials to almost all perfect insects, and to the great majority of larvæ. Yet many live in water, and require therefore some modification of the respiratory organs to fit them for this abode.

Although many perfect insects are found only in and about water, there are but few so essentially aquatic as to require any considerable alteration in this respect.

The *Orthoptera* or *Hymenoptera*, as far as we know at present, are without exception land animals. Although many

*Diptera* (flies) and *Neuroptera* (dragon-flies, may-flies, &c.), and a few *Lepidoptera* (butterflies, moths, &c.), are aquatic when in the larval state, yet the perfect insects of these orders live altogether in the air.

The *Hemiptera* (fieldbugs, &c.), on the contrary, present us with several aquatic insects; many of these however live *on* water rather than in it. Every one must have noticed *Velia currens*, a dark brown, long, narrow insect, which may be seen running on the surface of almost any pond. An allied species, *Halobates Streatfieldiana*, has been found coursing over the ocean midway between Asia and Africa.*

The genera *Nepa* and *Ranatra* live actually submersed, and are provided at the posterior part of the body with two tubes, varying in length according to the species, and which the animal projects out of the water and thus obtains the necessary supply of air.

Among the *Coleoptera* (beetles) three families are essentially aquatic—the *Gyrinidæ*, *Dyticidæ* and *Hydrophilidæ*. Besides these many little beetles live on the seashore, and are covered by the water for hours together. The *Gyrinidæ* or whirligigs must be familiar to all lovers of nature, as they may be seen during summer, in little troops coursing round and round in circles on almost every smooth surface of water, but they are entirely surrounded with air, for the lower part of their body is covered by a thin layer.

The *Hydrophilidæ* have clubbed antennæ, while in the *Dyticidæ* they are filiform (threadlike). The former swim with difficulty, and usually creep along the bottom, or on aquatic plants. They are obliged to come to the surface to breathe, and are enabled to carry down with them a supply of

* Trans. Ent. Soc. of London, vol. 1, p. 230.

air attached to the underside of the abdomen. It is said, that they project their club-shaped antennæ into the air, and then, jerking them back again, bring thus a little air, which they then apply to the under surface of the thorax and abdomen. This manœuvre I have never been able to see; the specimens, the habits of which I have watched, used every now and then to leave hold of the plant on which they were creeping, their own lightness causing them to rise, and the air on their under side turned them over in the ascent. They then crept along the top of the water, back downwards, till they came to some plant, by means of which they again descended. Some of the larger species can swim, but not so easily or quickly as the *Dyticidæ*. This latter family will be referred to presently.

The reason why we find some few aquatic *Hemiptera*, many *Coleoptera*, and none of any other order, is probably connected with the state of the wings. It is evident that the delicate state of the wings of a fly, bee or butterfly would be much if not entirely spoiled by a long sojourn in water; those, on the contrary, of the *Hemiptera* being in great measure, and of the *Coleoptera* entirely, protected by the horny anterior wing or elytra, it is in these orders only that we can expect to find any species with aquatic habits in their perfect state.

Considered in relation to the respiratory organs, however, the most remarkable insect is *Pteronarcys regalis*, a Neuropterous insect from Canada. Among 150,000 species at present known,* this alone possesses branchiæ in its perfect state! Well therefore might Leon Dufour, the greatest Entomological anatomist in the world, express unbounded astonishment at this "extraordinary" and "illegal" fact, and doubt the

* The lowest number estimated by Humboldt in his "Aspects of Nature."

conclusions of even Newport. M. Dufour remarks,* that a gill is an organ especially adapted to aquatic respiration, whose physiological function is to extract air from water, and would, therefore, be useless to an entirely aërial animal. He suggests, therefore, that they may be only the remains of the branchiæ of the nymph, retained—" oblitérées, infonctionables, simplement appendiculaires et vestigiaires."

Yet if we consider Newport's reasoning,† we must, I think, come to his conclusion.

There are eight sets of branchial sacs, or tufts distributed over the pectoral surface of the thoracic segments and first two segments of the abdomen. The three pairs of thoracic spiracles are situated as usual; the abdominal, however, are false, and each lead into a small cavity.

The habits of the insect, though not strictly speaking aquatic, are quite in accordance with the structure of the respiratory organs, for it lives under stones, in crevices of rocks which are constantly wetted by the spray of falling water, and in other damp places.

This single exception to the otherwise universal rule, that no perfect insect breathes by means of branchiæ, may well excite our wonder, and should teach us how cautious we ought to be in all generalizations in Natural History. Considering also how many insects there are of whose anatomy we may be said to be entirely ignorant, it may well be that there are various other interesting modifications of the respiratory organs with which we are as yet unacquainted.

Passing now to the larval stages, we shall meet with much

* Ann. des Sci. Naturelles—" Observations sur les Larves des Neuroptères," v. 17, p. 89, 1852.

† On the Anatomy and Affinities of Pteronarcys Regalis, Linnean Transactions, 1848, vol. xx.

greater variations: this appears to be in accordance with the general law that the very young states of animals often resemble in many particulars fully developed specimens which belong to inferior groups. Thus, as the *Crustacea* and many aquatic annulids respire by means of branchiæ, we should expect to find these organs in many larvæ, and in fewer pupæ or nymphs.

And so it is: many larvæ, for instance, those of the *Gyrinidæ* and of *Parapoynx Stratiotalis*, which possess branchiæ, and others, such as those of the *Dyticidæ* and *Hydrophilidæ*, are aquatic, turn into nymphs or pupæ which live in air.

This rule, however, is not without exceptions: the larvæ of some gnats, though living in water, come to the surface, and inspire air, while the pupæ are provided with branchiæ, which generally project from the thorax. I can in no way account for this exception.

There is, however, this essential difference between the gills of other water animals, as of fishes, and those of insects. In the former the blood or circulating fluid acts through the delicate walls of the tubes in which it runs, on the air contained in the surrounding water, while the gills of insects are membranous expansions penetrated by tracheæ, which imbibe the air contained in the water and carry it into the body, there to be acted upon in the usual manner by the blood. In what manner this is effected, by what mysterious process the air is thus absorbed, is one of those questions which constantly occur to Naturalists, and which we are at present quite unable to answer.

If we now endeavour to ascertain why some larvæ have branchiæ while others are compelled to ascend to the surface and obtain air from thence, we shall soon remark that, as a general rule, slow, inactive, or ill-defended larvæ are pro-

vided with branchiæ, while those that are powerful and active are without any. Thus the strong predacious larvæ of *Dyticus* and *Hydrophilus* respire air by means of openings situated at the tail. They hang suspended from the surface of the water, and the attitude which is necessary for respiration is also exactly that which gives them the best view of their prey swimming about in the water below. The larvæ of some gnats (*Culex*), though not so large, usually live in places—such as water-butts, cow-troughs, shallow pools, &c.,—where they are "monarchs of all they survey;" and having little therefore to fear from the attacks of larger animals, are provided with a short tube projecting at an angle from the tail, and terminating in a spiracle at the end, and, several hairs by which the insect hangs suspended from the top of the water, and makes from thence short excursions in search of food.

The larvæ of the *Tipulidæ* are found in the most varied situations; many of them live in water, and one of them is very peculiar. It is quite transparent, and, therefore, rather difficult to find, though not uncommon in clear grassy pools. It floats horizontally and almost motionless, though, when alarmed, it can swim away with rapidity. The breathing organs are four silvery kidney-shaped organs, two placed anteriorly and two posteriorly. This larva is figured by Reaumur, Histoire des Insectes, vol. v. pl. 6, f. 7, 9. I have often met with it in ponds on commons. The pupa is very different, being provided with two pear-shaped branchiæ which project like ears from the thorax, and give it a very peculiar appearance. It floats perpendicularly and has two leaf-like fins at the tail.

Perhaps, however, the most remarkable Dipterous larva is that of *Eristalis tenax*, Meig. It is a thick, fleshy, unarmed, sluggish grub, and yet breathes air. Living

usually in the very foulest water, it has nothing to fear from the attacks of more powerful insects, and does not require to conceal itself. It is provided with a tail about as long as the body, and perforated at the end. Two large tracheæ pass down the body, uniting posteriorly into one, which, after forming several coils at the base of the tail, passes up that organ, without being attached to it, and finally opens at the end into a large spiracle, surrounded with a star of hairs. The loose coils can, if necessary, be protruded up the tail, so as to extend the tail, if necessary, to five or six inches in length.

By this curious apparatus the animal is enabled to breathe air while remaining at some inches depth in water.

In the larvæ of *Ephemera* we met with a very different type. These animals live in ponds and ditches, where, if they were as defenceless, and at the same time as inactive as the larvæ of *Eristalis*, they would soon fall a prey to some enemy more powerful than themselves; and though they are so formed as to swim with rapidity, even this would be of little avail if they had to remain at the surface of the water to breathe. They are therefore provided with branchiæ, and are thus enabled to remain hidden among the thickets of water-plants.

The branchiæ are attached by pairs to the sides of the abdominal segments, making four to each segment. They consist sometimes of two leaves, as in *E. vulgata*, or of a leaf and a bunch of hairs, as in *E. fuscogrisea*, or sometimes of a narrow stalk clothed on each side with hair-like processes, as in De Geer, vol. ii. pl. 16, f. 3. The leaves agree in structure with the wings of the perfect insect, being formed of a flattened bag into which tracheæ send branches.

Thus as we find many insects with abdominal legs in their larval condition, so we find some which in the same state

have wings, or organs homologous with wings, on the abdomen. The wings of insects, therefore, are branchiæ which have lost their primary function, that of respiration, and become organs of motion. This change may appear extraordinary, but we must remember that we find, conversely, among *Crustacea*, numerous cases, as, for instance, the *Daphniæ*, in which the legs have ceased to serve as organs of locomotion, and on the contrary act as branchiæ. These views have been ably advocated by Prof. Owen, in his Lectures on the Invertebrate Animals, 1st edit. p. 198, but they can hardly be said to be yet generally received by Entomologists.

The larvæ of the *Phryganeæ*, the well-known caddisworms, live in streams and ponds ; they are slow in their movements, but even if it were otherwise, to say nothing of other enemies that usually live in the same places, they would have but little chance of escaping from the fish.

As we notice throughout the animal kingdom that any loss in one respect is usually compensated by a gain in another, so we find that these slow, delicate creatures are endowed with an instinct which teaches them to make for themselves tubes or cases of sand, bits of stick, or any other material that comes to hand, in which they can live secure.

This contrivance, however, is evidently an obstacle to agility, and the caddisworm is therefore provided with branchiæ, in the form of hairs or processes of the skin, into which the tracheæ penetrate.

We at present know of no Lepidopterous larvæ which can be said to move rapidly. That of *Parapoynx Stratiotalis*, whose aquatic habits have been already alluded to, is no exception to the rule. Living as it does in ponds the same mode of protection is resorted to as in the similar case of the *Phryganeæ*. It forms for itself a tube, and is provided

with branchiæ in the form of hairs, situated on the thorax and anterior portion of the abdomen, which is most exposed to the action of water.

The only other aquatic larvæ which I propose to mention are those of the *Libellulidæ* or dragon-flies: they are slow, awkward insects living in ditches and shallow ponds, and, like the preceding, are provided with branchiæ. But why? Covered with a tough leathery skin, large and armed with powerful jaws, they are well able to protect themselves, and are, in fact, entirely carnivorous. The reason, however, is evident. Unable to overtake their prey by the chase, they lie in wait, hidden by the mud at the bottom of the water, and seize any unwary little creature that may pass within reach. It is evident that they would stand a good chance of dying of starvation if they were compelled to leave their hiding-places, and remain at the surface of the water for air. Moreover, if their branchiæ were situated on the anterior part of the body, like those of *Parapoynx*, or on the abdomen, as in *Ephemera*, a large surface would necessarily be uncovered, which would serve as a warning to the little creatures which constitute their prey. They are therefore situated at the tail, and in the genus *Agrion* are in the form of elongated leaflets in which the tracheæ ramify as usual.

In the larvæ of *Æschna* and *Libellula* (dragon-flies),* on the contrary, the respiratory organs are formed on a type which is without a parallel, and which, though so familiar with the fact, I can never contemplate without a feeling of awe and admiration. The water is sucked in through the posterior orifice into the rectum or lower part of the intestinal canal, on the walls of which the tracheæ ramify in great numbers,

* Burmeister's Man. p. 169; Leon Dufour, Ann. de Sci. Nat. 1852, p. 91.

and extract the air from the water thus brought into contact with them.

Truth is indeed stranger than fiction. What man would have imagined such a machine? What but Almighty wisdom and power could have contrived and carried out these and many other means for supplying air to the internal organs of animals apparently so insignificant?

I have endeavoured in a few instances to point out how the different modifications of these organs are adapted to the different habits of their possessors, but there are many, very many variations, for which we cannot at present, and perhaps never shall be able to account. Some of them, as, for instance, the different forms of branchiæ in the *Ephemeræ*, we may perhaps ascribe to that tendency to variety which we see so strongly in nature. Of what use are the varied tints of different birds and the species of insects? Would not a much fewer number have fulfilled the same purpose?

And in support of this theory we may observe, that where man steps in and destroys many species, to increase the number of individuals of a few most useful to himself, these few immediately begin to vary. The chickens, ducks, pigeons, oxen, cats and horses, which, in a domestic state, are found of such different tints, were probably originally each of one colour; and if they revert to a wild life, they have a tendency to return also again to an uniformity in this respect. (See the observations of Mr. Darwin on the Oxen of the Falkland Isles, in his Naturalist's Voyage, p. 192.)

There is indeed one capital exception to this rule—the sheep; and we shall perhaps be more grateful than fanciful, if we observe that, in this instance only, variety of colour would diminish from the utility to man.

I will conclude with a brief statement of the manner in

which the breathing is effected in four familiar but very different animals.

Firstly, the whale, though often called a fish, is in reality a warm-blooded air-breathing mammal, and must, therefore, come to the top of the water at short intervals. For this purpose the tail is flattened horizontally, which enables the animal to rise and sink very quickly. If it breathed chiefly through the mouth, the action of the tail would tend to drive it out of the water, and much time would be lost in descending, as we know to be the case if we try to dive when swimming. In order to avoid this the nostrils are placed in the highest part of the body, and are made to serve the most important part in respiration.

The fish, on the contrary, is a water-breather, that is to say, it is provided with an apparatus in which the blood makes use of air contained in the water. This apparatus we call the gills; the water enters the mouth, and, instead of being swallowed, comes out again behind the gill-plates. The tail is flattened vertically, and it is by lashing this powerful organ first to one side and then to the other, that the fish darts forward with great velocity, but it cannot rise or sink so quickly as the whale, which is not requisite, as it is no longer under the necessity of coming to the surface to breathe.

In some parts of Scotland it is believed that salmon dart along tail forwards: it is almost unnecessary to say, that this is an error, for not only is it contradicted by the mechanical structure of the animal, but if it were so the fish would be suffocated, for the rushing water would press the gill-plates firmly to the sides of the fish, and no water therefore could reach the gills.

It is remarkable how few know why a fish dies when it is taken out of water, and yet the reason is very simple. When in the water the laminæ of the gills all stand apart,

and the surface is of course equal to the size multiplied into twice the number of the laminæ; but in air all the laminæ fall together, and the surface at which the breathing is carried on being very much diminished, the fish dies literally for want of air. Eels, however, and some others, have the gills contained in pouches, opening by small holes at the side of the head; and, as they thus carry a supply of water about with them, can live for some time out of their natural element.

In the Freshwater Snail (*Lymnæus*) we have gills as in the fish, but the animal not being able to move rapidly, other means are necessary to insure a constant supply of water. This is effected by means of ciliæ or little hairs, which thickly clothe the whole organ, and being in constant vibration, independently of the control of the snail, cause currents which bring a regular supply of water to the gills.

In insects I have already mentioned several methods by which the object is effected. One more I must allude to—that of the common large freshwater beetle, *Dyticus*. The spiracles of this insect are placed on the back under the wing cases or elytra. The two first pairs of legs are rather small and used for walking; the hind pair are strong, flattened and provided with a brush of hairs, and form an excellent pair of oars, propelling the beetle of course forwards. The whole animal is somewhat lighter than water, and the head and thorax are the heaviest parts; therefore, when it ceases rowing, it will of course rise tail-first to the surface. No one who has ever watched a still pond in summer can fail to have noticed the beetles thus coming up to the surface for a fresh supply of air. The back is covered with a velvet-like down, which repels the water. When, therefore, the insect is suspended as it were by its tail from the surface of the water, it has only to lift up a little the elytra and the space between

them and the back will be at once filled with air, a supply of which it is thus enabled to carry about with it. If this animal had breathed through the mouth, it could only by violent exertion have brought the heaviest part of its body to the surface, and, if alarmed, would have had to turn over before the action of the legs could come into play, whereas by receiving the air at the tail, these difficulties are removed and the powerful oars are ready at the least sign of danger to carry their owner, by a few rapid strokes, down to the bottom into the weeds or mud.

Thus I have attempted to give a slight account of the principal modifications of the organs of respiration in insects; but I am well aware that I have only been able to mention a small part of what has been already described, which is itself but a fraction of that which still remains unknown.

Still, though we must confess that God alone can see all that He has made, man also, we may hope, can perceive that it is "very good." Yet are we far from knowing, and perhaps never shall know, how good. Every day we discover fresh wonders, every day new fields of science are opened to us, and the naturalist can with truth adopt the words of the illustrious Newton, "I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

# DIPTERA.

## Dipterous Notes and Queries.

By W. Wilson Saunders, F.R.S.

Can any of the numerous readers of the Annual give me any information respecting the insects, some portion of whose economy I shall attempt hereafter shortly to describe? I ask the question, being aware that a number of our Entomologists are now much interested in the study of the habits and economy of the *Micro-Lepidoptera*, and it will have probably happened to them, that in their investigations they will have found some of my favourites—the *Diptera*—where a moth was expected to appear. I here allude to those Dipterous larvæ which mine in the leaves of plants, and work galleries very similar in construction to some produced by the larvæ of various species of *Micro-Lepidoptera*, so much so that it requires a very practised eye to detect to which order of insects the work of the little miner belongs. Other *Dipterous* larvæ make gall-like excrescences on various plants, which are exceedingly interesting and well worthy of careful examination. My queries belong to both miners and gall-makers, and I will therefore divide my Notes into two divisions, depending on these peculiarities of economy.

First, then, as to miners.

I. The leaves of *Conyza squarrosa* are mined in a very tortuous manner, particularly near the margin, by an elongate,

ovate, very pale dull yellow larva, having the joints of the body very finely hispid. The larva changes into an oval pupa, about the $\frac{1}{8}$ of an inch in length, of a shining black colour, and having two small knob-like projections at one apex, the other being slightly emarginate. I noticed the working of this larva in the neighbourhood of Dover, in the autumn of 1853.

II. A Dipterous larva mines into the leaves of the common daisy, *Bellis perennis*, producing a tortuous mine, which usually runs along one side of the leaf, commencing near the foot stalk, and, crossing the leaf somewhere towards the apex, returns down the other side. The mine I noticed several times near Whitby, Yorkshire, during the month of August, but the larva escaped my notice.

III. The common sow-thistle, *Sonchus oleraceus*, has its leaves often mined by a Dipterous larva producing a whitish intricate vermicular pattern, which is very apparent, the ground colour of the leaf being bright green. The larva is oblong ovate, not more than $\frac{1}{10}$ inch in length, smooth, somewhat shining, and nearly cylindrical, the joints being very obscurely marked. When removed from the mine the larva was exceedingly active and restless. This mining larva ap pears to be very common, as I have noticed it in various places in the south of England.

IV. A peculiar mine of a Dipterous larva I observed several times in the leaves of the common honeysuckle (*Lonicera Periclymenum*) in the neighbourhood of Whitby, Yorkshire, during the month of August. The mine consisted of a series of gently curved branches, having one common centre, and diverging from it in various directions. The

mine could be easily detected, being well marked by its pale appearance on a dark green ground. The perfect insect seems to make its exit from the mine at a point on the margin of the leaf—the mine terminating there, and a small hole being visible. I could not find the larva.

V. A Dipterous larva mines the leaf of *Pimpinella magna*, making a broad tortuous path, with so many windings that the whole of the substance of the leaf appears at times nearly eaten away. The larva I have not seen. This mine I noticed sparingly in the neighbourhood of Folkestone, Kent, in the month of September.

VI. A long snake-like mine commencing at the margin of the leaf of the common alder, *Alnus glutinosa*, and increasing in size as it advanced, was brought to my notice by my friend Mr. Stainton. He found it near Reigate in September. The larva was dead and shrivelled before I examined it. It was undoubtedly Dipterous.

Now as to the second division of my inquiries, namely, Dipterous larvæ forming gall-like excrescences, I shall be glad of any information which may aid in making the following observations more complete.

VII. At Bulverhythe near St. Leonards, in the beginning of August, I found several gall-like swellings on the stems of the common reed, *Arundo phragmites*, which were composed of the distended bases of the leaves closely packed one over the other, the further growth of the stem having been stopped by the action of a Dipterous larva, which was to be found snugly enjoying itself in the centre of the mass. These gall-like appearances were oblong ovate, varying

from two to three inches in length, and rather better than half an inch in diameter. Short malformed leaves diverged from the gall in all directions. The larva, which was so well protected and provided with food, was about half an inch in length, elongate ovate, tapering at each extremity, white, somewhat shining and translucent.

VIII. On the sand-hills at Land's End, near Whitby, *Triticum junceum* is an abundant plant, and at the commencement of August I found the young shoots near the ground attacked by a Dipterous larva, causing an oval gall-like swelling very similar to the one just described. This gall-like swelling was an inch to an inch and half long, very succulent, and was composed of the thickened basis of the sheathing leaves. The larva was about one-eighth of an inch long, very smooth and glossy, whitish and translucent, subcylindrical, somewhat tapering at the extremities, with a row of short tubercles on the back, one on each joint, commencing with the second and terminating with the eighth joint.

IX. At Birch Wood, the 7th July, I found the stems of *Hieracium umbellatum* attacked by a Dipterous? larva, causing a very hairy pear-like swelling, from which proceeded a number of stunted, well-formed leaves. Some of these gall-like swellings were more than half an inch in diameter, and fully an inch in length. They occurred at the apex of the stems.

X. In a shady part of a wood near St. Leonards, the stems and rhizomas of *Stachys sylvatica* were found in the beginning of September, by my son, covered with small gall-like excrescences about the size of a pea. They occurred in

the axils of the leaves, or terminating the branches, or as knob-like projections from the roots, and were round or oval, yellowish-green, densely hairy, and composed of stunted succulent leaves closely packed together. Each gall contained three or four Dipterous larvæ, about one-tenth of an inch long, ovate elongate, somewhat flattened above and below, white, with a broad brownish yellow streak, extending from the second to the penultimate joint on the underside.

XI. The common Ground Ivy, *Glechoma hederacea*, is attacked by the larva of a Dipterous insect, and produces a gall-like excrescence at the apex of the branches. The gall seems to be composed of a greatly distended and succulent leaf, folded together and soldered at the margin, forming a rounded pointed ball, nearly one-third of an inch in diameter, densely clothed externally with woolly pubescence. I have seen this gall in the vicinity of Mickleham during the month of August.

XII. During the month of August, while hunting over the broken ground at East Wear Bay, near Folkestone, for insects, my attention was arrested by observing an umbel of seed vessels of the common carrot, *Daucus carota*, having one seed vessel among the number of a much larger size in proportion to the rest, greatly distended to a nearly spherical form, and much more free from bristles than these seed vessels usually are. Generally one only was found in an umbel, and on looking carefully to a great number of umbels, I found the fact observed to be very common. Further examination showed me that each of these inflated seed vessels or carpets contains one or two bright orange, very active Dipterous larvæ, about the one-eightieth of an inch

long. The larvæ were sub-cylindrical, tapering at each extremity, and appeared to feed upon the internal succulent walls of their curious abode. My friend Mr. Stainton observed the same fact on Wray Common, near Reigate, Sept. 1856, and obligingly sent me some of the umbels of the *Daucus* so attacked for examination.

XIII. In the vicinity of Dover I have observed the hedge bedstraw, *Galium mollugo*, with some of its seed vessels very much inflated, and assuming a rough, pear-like form. This enlarged seed vessel, if opened at the proper season, August, will be found to contain a small yellow Dipterous larva, one-tenth of an inch long, ovate elongate, more attenuated towards the head, slightly flattened on the upper and under surface. In old and empty inflated seed vessels, which had evidently been the abodes of larvæ, I found a small round aperture near the footstalk, through which the insect had escaped from its prison.

# NATURAL HISTORY OF THE TINEINA.

By the Editor.

During the past year no further volume of this work has appeared. But yet the subject has not been lost sight of; a number of larvæ have been described and figured, and a vast amount of observations have been made.

Those who are contributing to the progress of this work are naturally anxious to know to what extent their help becomes serviceable, and with the view of notifying to my coadjutors and others, the amount of assistance I have received in the past twelve months, the following Table has been prepared.

I had made known some time since, that assistance in the discovery and forwarding to me of new larvæ would be recompensed in a peculiar manner, namely, by presenting a copy of the entire series of the Natural History of the Tineina to any one who should *first* discover and communicate to me the transformations of twenty species with which I was previously unacquainted.

Now, in finding new larvæ, there are three distinct steps the discoverer has to make:—

The first, and most important, is the *discovery* of the larva.

The second is the *sending* such larva to me, in order that it may be duly figured and described.

The third is the *rearing* of such larva through its transformations, so as to ascertain the perfect insect produced from it.

It will frequently happen that, whilst one person will first *discover* a new larva, some other Entomologist will be the first to *send it* to me, and a third will perhaps be the successful *breeder*. Hence the reward offered for the discovery and first communication of the transformations of a new species may have to be divided into three shares. Accordingly in the annexed table I have apportioned the reward into three parts:—A half, or ·50, to the discoverer of the larva; a quarter, or ·25, to the party first sending it to me; and a quarter, or ·25, to the party who first rears the perfect insect.

And, as previously no reward was offered or given for the sending of such larvæ as, though previously known, I was still in want of, a quarter prize, or ·25, is here awarded to each person sending me some larva that I wanted, even though its history had already been published.

| | | Discovered. | Sent. | Bred. | Sent. Known *before.* |
|---|---|---|---|---|---|
| Xysmatodoma melanella ..... | Edleston ..... | .. | .. | .. | ·25 |
| Tinea vinculella ..... | Schmid ..... | .. | .. | .. | ·25 |
| bistrigella ..... | Boyd ..... | ·50 | ·25 | .. | |
| | Logan ..... | .. | .. | ·25 | |
| Lampronia Rubiella ..... | T. Wilkinson .. | .. | .. | .. | ·25 |
| Lamprosetia Verhuellella ..... | Drane ..... | .. | .. | .. | ·25 |
| Hyponomeuta vigintipunctatus | Newnham .... | .. | .. | .. | ·25 |
| Padi ..... | Beaumont .... | .. | .. | .. | ·25 |
| *Anesychia pusiella ..... | Frey ..... | .. | .. | .. | ·25 |
| decemguttella .... | H. J. Harding.. | .. | .. | .. | ·25 |
| Cerostoma vittella ..... | Miller ..... | .. | .. | .. | ·25 |
| nemorella ..... | Schmid ..... | .. | .. | .. | ·25 |
| Depressaria nanatella ..... | H. J. Harding.. | .. | .. | .. | ·25 |
| * parilella ..... | Schmid ..... | .. | .. | .. | ·25 |
| furvella ..... | Mühlig ..... | .. | .. | .. | ·25 |
| emeritella ..... | Mühlig ..... | .. | .. | .. | ·25 |
| *Gelechia Artemisiella ..... | Schmid ..... | .. | .. | .. | ·25 |
| tæniolella ..... | Schmid ..... | .. | .. | .. | ·25 |
| mulinella ..... | Schmid ..... | .. | .. | .. | ·25 |
| nigricostella ..... | Schmid ..... | ·50 | ·25 | ·25 | |
| *Anarsia Spartiella ..... | Boyd ..... | .. | .. | .. | ·25 |
| Ypsolophus fasciellus ..... | Schmid ..... | .. | .. | .. | ·25 |
| Harpella Bracteella..... | Grabow ..... | ·50 | ·25 | ·25 | |
| Butalis Chenopodiella..... | Schmid ..... | .. | .. | .. | ·25 |
| dissimilella ..... | Schmid ..... | ·50 | ·25 | ·25 | |
| Acrolepia cariosella..... | Mühlig ..... | ·50 | ·25 | ·25 | |
| Perittia Herrichiella ..... | Frey ..... | .. | .. | .. | ·25 |
| Argyresthia Goedartella ..... | Brockholes .... | .. | .. | .. | ·25 |
| Cedestis farinatella ..... | T. Wilkinson .. | ·50 | ·25 | ·25 | |
| Ocnerostoma piniariella ..... | C. S. Gregson .. | .. | .. | ·25 | |
| *Gracilaria semifascia ..... | Ashworth .... | ·50 | .. | ·25 | |
| * Kollariella ..... | Schmid ..... | .. | .. | .. | ·25 |
| ORNIX LOGANELLA ..... | T. Wilkinson .. | ·50 | .. | ·25 | |
| Coleophora Wockeella..... | Bond ..... | .. | .. | .. | ·25 |
| ochrea ..... | Schmid ..... | .. | .. | .. | ·25 |
| albicosta ..... | Law ..... | .. | .. | .. | ·25 |
| Genistæ ..... | Wailes ..... | ·50 | ·25 | ·25 | |
| succursella ..... | Mühlig ..... | ·50 | ·25 | ·25 | |
| Serratulella ..... | Mühlig ..... | ·50 | ·25 | ·25 | |
| odorariella ..... | Mühlig ..... | ·50 | ·25 | ·25 | |

| | | Discovered. | Sent. | Bred. | Sent. Known *before.* |
|---|---|---|---|---|---|
| Coleophora Dianthi ..... | Mühlig ..... | ·50 | ·25 | ·25 | |
| Silenella ..... | Mühlig ..... | ·50 | ·25 | ·25 | |
| * ditella ..... | Schmid ..... | .. | .. | .. | ·25 |
| Saponariella ..... | Mühlig ..... | .. | .. | .. | ·25 |
| Coronillæ ..... | Mühlig ..... | .. | .. | .. | ·25 |
| Inflatæ ..... | Boyd ..... | ·50 | ·25 | ·25 | |
| Virgaureæ ..... | Schmid ..... | ·50 | ·25 | | |
| | Parfitt ..... | .. | .. | ·25 | |
| argentula ..... | Parfitt ..... | .. | .. | ·25 | |
| * Vitisella ..... | C. S. Gregson .. | ·50 | ·25 | ·25 | |
| *Cosmopteryx Schmidiella .... | Frey ..... | ·50 | ·25 | ·25 | |
| Laverna ochraceella..... | T. Wilkinson .. | ·50 | ·25 | | |
| Raschkiella ..... | Machin ..... | ·50 | ·25 | ·25 | |
| Chrysoclista Linneella ..... | Wildman..... | .. | .. | .. | ·25 |
| Anybia langiella ..... | Parfitt ..... | .. | .. | .. | ·25 |
| Asychna æratella ..... | Grabow ..... | ·50 | ·25 | ·25 | |
| *Stagmatophora Heydeniella .. | Schmid ..... | .. | .. | .. | ·25 |
| Elachista Pfeifferella ..... | Frey ..... | ·50 | ·25 | ·25 | |
| adscitella ..... | Scott ..... | ·50 | ·25 | ·25 | |
| tæniatella ..... | Scott ..... | ·50 | ·25 | ·25 | |
| Tischeria angusticollella ..... | Frey ..... | .. | .. | .. | ·25 |
| Lithocolletis Bremiella ..... | Schmid ..... | .. | .. | .. | ·25 |
| Vacciniella..... | C. S. Gregson .. | .. | .. | .. | ·25 |
| quinquenotella .. | Schmid ..... | .. | .. | .. | ·25 |
| Staintoniella .... | Schmid ..... | .. | .. | .. | ·25 |
| * populifoliella .... | Frey ..... | .. | .. | .. | ·25 |
| *Lyonetia padifoliella ..... | Frey ..... | ·50 | ·25 | ·25 | |
| Cemiostoma lustratella ..... | Frey ..... | .. | .. | .. | ·25 |
| Bucculatrix Demaryella ..... | T. Wilkinson .. | ·50 | ·25 | ·25 | |
| * maritima ..... | Hemmings .... | ·50 | ·25 | ·25 | |
| Hippocastanella .. | Ashworth .... | .. | .. | .. | ·25 |
| nigricomella ..... | Frey ..... | .. | .. | .. | ·25 |
| *Nepticula minusculella ..... | Frey ..... | ·50 | ·25 | ·25 | |
| Tiliæ ..... | Frey ..... | ·50 | ·25 | ·25 | |
| centifoliella ..... | Mühlig ..... | .. | .. | .. | ·25 |
| vimineticola ..... | Frey ..... | ·50 | ·25 | ·25 | |
| arcuata ..... | Douglas ..... | ·50 | | | |
| | Frey ..... | .. | .. | ·25 | |
| | Boyd ..... | .. | ·25 | | |
| Weaveri ..... | C. S. Gregson .. | .. | .. | .. | ·25 |
| atricollis ..... | Boyd ..... | .. | .. | ·25 | |
| luteella ..... | Boyd ..... | .. | .. | ·25 | |

From this Table it appears (as was only natural from the greater number of the European species with which I had no personal acquaintance) that the greatest amount of assistance has been received from abroad; but it is very gratifying to observe that the assistance in this country, which used to be exclusively confined to three or four Entomologists, is now gradually diffusing itself among a greater number.

The summary of the Table yields the following results:—

| | | | |
|---|---|---|---|
| Frey | 7·75 | Douglas, H. J. Harding | ·50 |
| Mühlig | 7·25 | Beaumont, Bond, Brockholes, Drane, Edleston, Law, Logan, Miller, Newnham, Wildman | ·25 |
| Schmid | 6·50 | | |
| T. Wilkinson | 3·75 | | |
| Boyd | 2·75 | | |
| Grabow, Scott | 2· | | |
| C. S. Gregson | 1·75 | | |
| Ashworth, Hemmings, Machin, Wailes | 1· | | |
| Parfitt | ·75 | | |

Of those marked thus * in the foregoing Table, I shall be glad to receive further specimens. The larva of ORNIX LOGANELLA I have not yet seen.

# NEUROPTERA.

## Explanation of Terms used by Dr. Hagen in his Synopsis of the British Dragon-flies (ante, pp. 39—60).

By A. H. Haliday.

As Dr. Hagen's paper is intended to facilitate the naming of specimens by collectors, it occurred to me that an explanation of the peculiar terms used in Libellulology would be very acceptable. I have therefore prepared the following brief explanation :

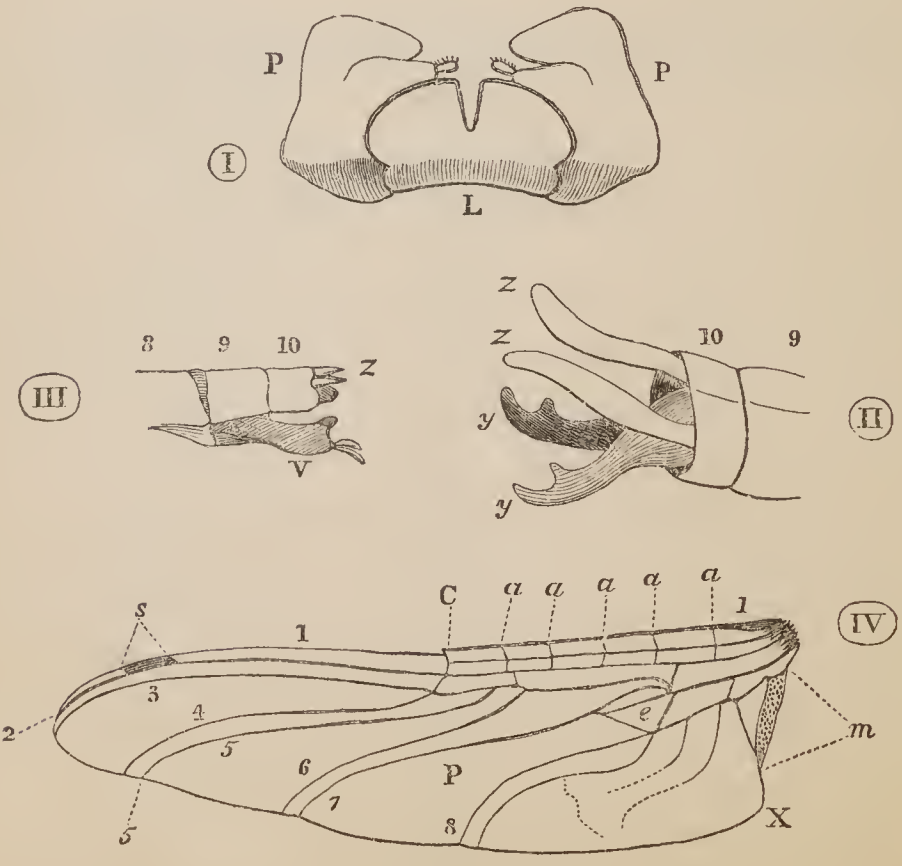

Fig. I. represents the Labium of *Libellula.*

L. The Labium proper, formerly called the middle lobe of lower lip.

P. The Palpi, formerly called the lateral lobes of lower lip.

Fig. II. represents the extremity of the abdomen of a *Cordulia* ♂, seen obliquely.

10 is the last dorsal segment.

*z z* the upper anal appendages.

*y y* the lower anal appendages.

Fig. III. represents the extremity of the abdomen of *Agrion* ♀, side view.

10 is the last dorsal segment.

*z* is the tentacula.

V is the vulvar scale.

Fig. IV. represents the hind wing of *Cordulia ænea*, with the course of the principal nervures only expressed.

X is the anal angle.

*m* is the accessory membrane (the stippled space).

3, 4, 5, 6, 8, 9 are main nervures, called "Sectors."

1 is the costal nervure.

2 and 7 are the main nervures, called "Radii."

2 is radius principalis.

7 is radius medius.

5 is the subnodal sector.

C is the cubital point.

*a—a* are the ante-cubital nervures (transverse).

*s* is the Pterostigma.

*e* is the triangle.

P is the post-trigonal area (included between the radius medius 7, and the sector 8).

The term "*adult*" used in several of the descriptions arises from the fact that *these insects* are often *many days* on the wing before they get the *mature* colour.

# NEW WORKS ON ENTOMOLOGY.

(By the Editor.)

The present year has produced in England several Entomological works of unusual importance.

We proceed to enumerate eight, of which the two last are still in progress of publication.

THE WORLD OF INSECTS; A Guide to its Wonders. By J. W. Douglas, Secretary to the Entomological Society of London. 12*mo. pp.* 244. *Price* 3*s.* 6*d.* London: John Van Voorst.

This little work treats in an easy and pleasant style of the varied haunts which insects frequent, and commencing truly with the beginning, the first chapter treats of "the house." One is really surprised, how much there is to be noticed in the habits and ways of the insects occurring actually in our habitations. The successive chapters are headed: The garden—The orchard and fruit garden—The fields—The hedges and lanes—The fences—The heaths and commons—The downs—The woods—The waters—The sea shore and the mountains.

As a specimen of the aim and intent of the writer, we quote the preface entire.

"'Business must be attended to.' Undoubtedly. There is no need to insist upon the maxim, for it is observed as religiously as if it comprised the whole duty of man. Rather should it be, 'the intervals of business must be attended to.' Business is a compulsory affair, a man's leisure is his own; and for his own sake, as well as that of the community, it should be leisure of occupation. And, as mere mercantile business has a tendency to contract the range of thought, and to give a money value to all matters, a man's

pleasures and recreations should have a contrary character, and cultivate those powers of his mind that are untouched by his business avocations; in order that he may see all things on both sides and in their true light.

"There is no employment for leisure hours, whether they be the few of the man of business or the many of the man of no business, more innocent in itself or more productive of benefits than the pursuit of Natural History generally; and Entomology, or the Natural History of Insects, on account of the number, beauty and accessibility of its objects, has peculiar advantages as a means of popular recreation. Once begun, *ennui* and the want of something to do vanish, every step is on enchanted ground, and on all sides the prospect becomes more and more enticing. The inducement to go out of doors,—the walk with a purpose in view,—so different to that most dreary of all employments, walking for the sake of exercise,—is itself no mean advantage. Then the collector wants to know something about the nature of the insects he has acquired, and begins to study their habits, forms and relationships. This calls into exercise the practice of patience, of minuteness and accuracy of observation, and eventually of cautiousness in induction and generalization; all of which, besides their value as elements of mental discipline, are qualities serviceable in an eminent degree in the business of life. Bonnet has said, 'when I see an insect working at the construction of a nest or a cocoon, I am impressed with respect, because it seems to me that I am at a spectacle where the supreme artist is hid behind the curtain.' Who can view such scenes continually without forgetfulness of self, and having his thoughts carried upwards, and becoming not only a wiser but a better man?

"Contrast with such an employment of leisure, the way in which the majority of young men spend their spare hours,—dissipation, frivolous amusements, or the ephemeral literature of the day,—and who can be surprised that the result, so far as regards the cultivation of the individuals, is *nil*, the balance being on the other side. There is a minority of young men, I know, that do better than this, yet, without any desire to undervalue literature or art,—nay, with every inclination to reverence and appreciate genius of every kind, whether showing the power of mind over mind, or the power of mind over matter,—I still believe that man and his doings, his follies and his crimes, engage too much of our attention. And if we go beyond the circle of human sympathy, I fear we are too prone to be passive; we like knowledge to come to us secondhand—filtered through other men's brains; and we take their conclusions —the truth as it appeared to them—to be the whole truth. But no

man, however great, has so thoroughly comprehended any subject as to have exhausted it; every phase of nature has yet at least another point from which it may be viewed. For observers and reasoners Natural History still offers a boundless field. I have no wish to elevate Entomology above its rank in the scale of Natural History science, nor to laud it as a panacea for the evils accruing to society from the waste of time; but I am sure that whether as a recreation, a study, or both, it would give to multitudes a pleasure, of which, although so sadly in want, they have now no idea.

"When it is considered that there are above ten thousand species of insects in Britain, it will be obvious how few of the wonders of insect life I have been able to indicate within the limited compass of these pages. For the same reason it will easily be understood that no single individual can ever hope to have within his own experience the Natural History of even the insects of his own country; and when the facts I have mentioned have not come under my own eyes, or when they have already been graphically set forth by others, I have preferred, as the more effective and honest course, to quote the very words of the narrators, rather than to give a story of my own founded upon them.

"My endeavour has been to put some of the more prominent and interesting characteristics of insect life into a readable form, to point out some of the best localities for insects, and the methods of capture, with the hope that the readers will be induced to go and examine the objects for themselves. If I shall have succeeded in this labour of my leisure hours, I may be induced to continue the work; but at any rate I shall be happy to answer any inquiries addressed to me through the post."

PRACTICAL HINTS RESPECTING MOTHS AND BUTTERFLIES, WITH NOTICES OF THEIR LOCALITIES; FORMING A CALENDAR OF ENTOMOLOGICAL OPERATIONS THROUGHOUT THE YEAR IN PURSUIT OF LEPIDOPTERA. BY RICHARD SHIELD. 12*mo*. *pp*. 194. *Price* 3*s*. LONDON: JOHN VAN VOORST.

This work divides the subject, not into the *places* where insects occur, but into the *months* in which they are met with; thus, there are twelve chapters, one for each month in the year, and under each month the reader is cautioned what Lepidopterous insects he should be searching for, and how and where he is likely to find them. In our younger days how we should have revelled in such a book?

We well remember how we gloated over the pages of the Calendar of Samouelle's Entomologist's Compendium.

In the chapter for January, we have information as to the apparatus required for breeding insects, and an excursion to Wickham.

In the chapter for February we have a caution against believing every thing we read in books (and never was caution more needed, the young especially are so apt blindly to swallow whatever they see in print), and an excursion to Plumstead.

In the chapter for March we have a discourse about sugaring, and an excursion to Sanderstead.

The opening portion of the chapter for April incites the collector to humility and industry, and then follows an excursion to Dartford Heath.

As a specimen of the book, we quote the following from the chapter for August.

"It was remarked by the celebrated Dr. Johnson, on being told that a person whom he knew had destroyed himself, 'that he never would have done so had he learnt how to hem a pocket handkerchief.' Now, to how many of the working men of this country, who now find the little time which they can call their own, after the labours of the day are over, hang heavily on their hands, may this remark apply; many of them listlessly sitting in the chimney corner with a pipe in their mouths, their thoughts of as little practical worth as the smoke that wreaths round their heads; some victims to *ennui*, not knowing how to spend their time or what to do, and many, I grieve to say, spending their time in a more than questionable manner to the profit of the publican and the degradation of themselves—to how many of this class would the study and contemplation of the works of nature bring happiness and contentment, raising them from the grovelling and debasing tendencies that kind of society into which a working man is usually thrown produces, expanding his intellect, giving him larger and more comprehensive views of the great plan of creation, and the relations we bear to each other and the world at large; and fostering in him habits of observation and reflection eminently calculated to make him a better citizen and a better man. The habits of order, reflection and energetic industry he will have acquired in the pursuit of Entomology (and indeed by all branches of Natural History the same effect will be produced upon the earnest student), will tincture all his actions, and thus he will not only become more happy as a man, but more valuable as a servant."

It may surprise some of our readers to hear that the writer of the work before us is himself "a working man." The Author of "Alton Locke" observes in the 3rd Edition of "Glaucus," "I would

gladly devote more space than I can here spare to a review of this little book, so perfectly does it corroborate every word which I have said already as to the moral and intellectual value of such studies."

INSECTA BRITANNICA—DIPTERA. *Vol.* III. By Francis Walker, F. L. S. 8*vo. pp.* 352. *With* 10 *plates. Cloth. Price* 25*s.* London: Lovell Reeve and Co.

This volume, the concluding volume on the Diptera, as originally intended (though we now hear there is some talk of another supplementary volume), comprises the Nemocera and the Suctoridea, or Fleas, which are considered by Mr. Walker as belonging to the order Diptera.

The Nemocera he divides into ten families, viz.—1. *Mycetophilidæ.* 2. *Cecidomyidæ.* 3. *Bibionidæ.* 4. *Simulidæ.* 5. *Chironomidæ.* 6. *Culicidæ.* 7. *Phlebotomidæ.* 8. *Heteroclitæ.* 9. *Tipulidæ* and 10. *Rhyphidæ.*

It must be very gratifying to Mr. Walker to hear the *dictum* of the great Dipterist of Posen, Professor Loew, that the arrangement "adopted by Mr. Walker is one of the best, or even *the* best, systematic arrangement of the *Diptera* that has yet been proposed."

In the precise definition of species Mr. Walker has not been so happy, and here there is much to be desired; but considering how vast is the subject, and how little encouragement the *Dipterist* receives, we ought not to feel surprised at the frequent absence of that almost mathematical precision which the describers of *Coleoptera* and *Lepidoptera* have now attained.

*They* have the advantage of having the differential characters of species pointed out by some twenty or thirty pair of discerning eyes, for many Entomologists who never wrote a book, nor even a scientific paper, are most serviceable to the scribbling generation by calling their attention to the differences, minute yet constant, which tend to show the specific distinctions of certain insects. The *Dipterist* has not this advantage, he works almost alone. Is it surprising he should occasionally stumble?

Professor Loew (in the Review already alluded to, Nat. Hist. Review, p. 92) remarks, "This work appears to fall very short of what a Fauna of Britain ought to contain. The species already known as British are not fully enumerated (in the second volume especially), neither are the species given, all unquestionably indigenous; on the contrary, many are introduced on mere conjecture and probability, as a considerable proportion of the species

of *Ceratopogon* and *Cecidomyia* in the third volume. In the second volume many are mentioned merely by name as British, the specific identity of which is in nowise authenticated, but in many cases is, in all probability, mistaken. The object of enabling the collector to name his insects in the readiest and shortest way is not at all satisfactorily attained. The analytic tables, intended as a guide to the determination of the species, come very near the mark indeed in some cases; as in the family *Dolichopidæ*, where the analysis only wants to be carried out further, when it leads to several species collectively. In other cases, they have a semblance of precision, which tends rather to mislead, as in the genera *Tachina* and *Anthomyia*. The diagnoses and descriptions are not of uniform quality in all the families; sometimes the description is little more than a translation or paraphrase of the diagnosis, where the repetition should have been avoided, if but for the sake of saving room; nor, in fact, does there appear any good reason for keeping the two distinct. It would have been better if Mr. Walker had consolidated them, confining himself to the distinctive characters, especially those of form, and signalizing the differences from the nearest allied species more particularly than he has done. Scarcely any directions are given where to find the insects, or how to procure them by rearing; and this in a work professedly intended for the use of collectors.

"Scientific Entomologists have neither right nor motive to look down on those who occupy themselves chiefly with collecting; but on the contrary, the strongest reasons to afford them all possible encouragement and aid. The recruits of science must be drawn from the ranks of the collectors, and many mere collectors have rendered as much good service to science as scientific smatterers have done harm by their scribbling."

This last paragraph will naturally not be very palatable to those who look upon themselves as *Dons* in the science, far removed from the collecting *profanum vulgus*. Encourage and incite the collector to further progress by all means, but do not show that you view him with contempt and scorn; by so doing you draw more widely a line of demarcation between those who have not yet crossed the threshold of the temple of the science, and those who are already within its precincts. If the object of those who have entered the *penetralia* be merely *distinction*, such conduct on their part is natural enough, as by depreciating their neighbours they fancy they exalt themselves; need we add, that we view such conduct as the offspring of a *puerile vanity*, loathsome in the eyes of all right-minded individuals.

INTRODUCTION TO ENTOMOLOGY; OR, ELEMENTS OF THE NATURAL HISTORY OF INSECTS. COMPRISING AN ACCOUNT OF NOXIOUS AND USEFUL INSECTS; OF THEIR METAMORPHOSES, FOOD, STRATAGEMS, SOCIETIES, MOTIONS, HYBERNATION, INSTINCT, &C. BY WILLIAM KIRBY, M.A., F.R.S., F.L.S., Rector of Barham; AND WILLIAM SPENCE, ESQ., F.R.S., F.L.S. *Seventh Edition, with an Appendix relative to the Origin and Progress of the Work. In one closely printed Volume of* 607 *pages. Crown* 8*vo. price* 5*s. Cloth.* LONDON: LONGMAN, BROWN, GREEN AND LONGMANS.

In the volume before us we find prefixed the following note.

"This work is now published at one-sixth of the price of the sixth edition, so as to bring it within the reach of all desirous of becoming acquainted with the Natural History of Insects, and thus carrying out more effectually the object of the authors,—that of introducing others to a branch of science which they have found so delightful. Though compressed by a smaller type into one volume, it contains every line of the sixth edition, which included much new matter not in the five preceding editions; and to render the work more complete, the account of its origin and progress, furnished by Mr. Spence to the *Life* of Mr. Kirby by Mr. Freeman, is, with his permission, given as an Appendix."

From a notice in the Natural History Review for 1856, p. 51 (which we are inclined to attribute to the pen of Mr. Patterson, of Belfast, whose "Zoology for Schools" already enjoys a circulation of eighteen thousand), we extract the following:—"No work in the English language we believe has done more than Kirby and Spence's learned and popular Introduction to spread the taste for Natural History at home, and to extend for it the sphere of observation, from the more conspicuous but limited field which the Vertebrata affords, to the countless species, and more varied history, transformations and instincts, of the Annulata, and thence indirectly to all the lower forms of animal life. Nor has its popularity been limited to one tongue or country, but either through the medium of translations, or by the obvious influence which it has exercised, ever since, over the most esteemed elementary books in other European languages, the influence given has been propagated extensively in a widening circle. In noticing this new edition, however, it is with home readers we have to do, and

especially with the young, who enjoy a privilege that we of a former generation were debarred from, in being early admitted to fields of instruction and delight, which some time ago were strictly fenced off from the narrow pen-fold of 'general education.' . . . . . The book is, indeed, a marvel of cheapness, considerably more thau 600 closely-printed octavo pages for 5*s*. . . . . To our readers old and young—parents, children, teachers, respectively, we say, 'buy and read,' enjoy, verify and enlarge, by the use of your own eyes and faculties, the curious details in rural economy, animal biography, and mental philosophy, amassed with so much study and personal observation, and digested with equal taste and judgment by the learned authors indissolubly associated in fame and remembrance, as they were in life-long friendship, though now for a little while separated by a temporal change. To the survivor of the two, we owe a very charming addition to the volume in the shape of letters and recollections connected with the first conception and progress of the work, and the cordial friendship which, having originated and matured the undertaking, so long survived its completion and participated its success."

THE ENTOMOLOGIST'S WEEKLY INTELLIGENCER FOR 1856. 8*vo*., *pp*. 212, *cloth*. *Price* 9*s*. London: E. Newman, 9, Devonshire Street; W. Kent and Co., 51 & 52, Paternoster Row.

This originally appeared in penny* weekly numbers, and as an instantaneous *medium* of communication between Entomologists in all parts of the country it has proved most serviceable. The low price and the amount of amusing matter infused into it rendered it

* Of course 26 penny numbers only cost 2*s*. 2*d*.: why then is the entire volume charged 9*s*.? Simply for this reason; the circulation was not sufficiently extensive to make the sale at a penny remunerative. Several Entomologists suggested a subscription should be made amongst them for the amount of the *deficit*. This the Editor declined, but having a number of copies on hand, he fixed on the complete and bound sets such a price, that, if the whole were cleared off at that rate, the loss would be *nil*, or nearly so.

The Editor wishes to make the continuance of the "Intelligencer" a certainty: at present it is only an experiment. Every additional subscriber increases the chance of the "Intelligencer" being continued. The Editor would like to have it occasionally illustrated with wood-cuts. Is he too sanguine? The number of Entomologists is daily increasing.

a favourite with many, who would shrink from taking up an ordinary scientific work. Yet in spite of all we have said or written on this subject, there still exist people so stupid as to maintain that scientific books should be adapted only to the capacities of those who are already scientific, and should not be partially adapted to the capacity of the unlearned, with the view of tempting them to move forward in a scientific direction. Every reader found in the Intelligencer something he could understand and appreciate.

It was by some considered an extremely wild-goose speculation to attempt to bring out a penny weekly journal in any degree scientific, and in good truth, a few years ago, this would not have been practicable; but, thanks to Mr. Milner Gibson and his colleagues, their endeavours to remove the taxes on knowledge, and their success in obtaining the repeal of the newspaper stamp and advertisement duty, have rendered that possible, which previously was not so. The day we trust is not far distant when the paper duty, that great foe to education and civilization, will also be removed, *it is already doomed*, and the first possible opportunity that occurs of repealing the excise duty on paper no chancellor of the exchequer will venture to incur the odium of retaining it.

The Entomologist's Weekly Intelligencer will be resumed next April, and we trust all who wish well to it will give it their energetic support; it is not yet self-supporting, and it is only by a large increase in the number of subscribers, that we can insure the permanent continuance of so useful a journal. Those who wish their copies forwarded by post are requested to transmit 4*s.* 4*d.*, in postage stamps, to E. Newman, 9, Devonshire Street, Bishopsgate Street, on or before March 20th, 1857. Two copies will be sent weekly for a remittance of 6*s.* 6*d.*; three copies for 8*s.* 8*d.*; four for 10*s.* 10*d.*, or five for 13*s.*

ON THE VARIATION OF SPECIES, with especial reference to the Insecta; followed by an Enquiry into the Nature of Genera. By T. Vernon Wollaston, M.A., F.L.S. 8*vo. cloth.* *Price* 5*s.*

London: John Van Voorst.

This is a remarkable book in several respects. In the first place, though Mr. Wollaston's name is indissolubly connected with a quasi-elephantine quarto of formidable weight and dimensions, the present work of his is an ordinary-looking small octavo, and can be carried in the coat-pocket; so that no one need be afraid of ordering it, for fear that when it arrives he should not be able to get it on to any of his bookshelves.

In the second place, it is a valuable and philosophical work written in a suggestive spirit; the bulk of the work being occupied by a consideration of the extent to which species undergo variation "from climatal causes generally,"—"from temporary heat or cold of an unusual degree,"—"from the nature of the country and of the soil,"—and "from isolation and exposure to a stormy atmosphere." Individual examples that have come under Mr. Wollaston's own observation are given of the effect of these different influences, and *nothing is dogmatically stated.* The reader is allowed to deduce his own inferences from the facts brought under his notice.

In the third place this work is remarkable for having escaped the notice of the "Athenæum:" week after week have we glanced through the pages of that journal, but hitherto we have failed to light on an article on Wollaston '*On the Variation of Species.*' Of course we are led to speculate on the cause of this omission, and the only conclusion we have come to is, that the party who reviews Entomological books for the Athenæum (apparently a harmless, well-meaning individual, not overstocked with brains) found the book too deep for him; he could not understand it, so solved the Gordian knot by not saying a word about it. We know not whether it was entrusted to the same party to review who had noticed in 1854 the '*Insecta Maderensia*,' but that book had plates, and therefore appealed more vividly to the senses, and the plates, if we remember rightly, were more highly praised than the rest of the book—we presume because they were more within the capacity of the reviewer. We hope in saying this we are not "treading on the corns" of any of our friends, but even if that should be the case, we cannot unsay it—excess of politeness is not our weak point.

## A MANUAL OF BRITISH BUTTERFLIES AND MOTHS. By H. T. Stainton. *In threepenny monthly numbers of* 24 *pages.* 12*mo. Illustrated with wood-cuts. Nos.* 1—10. (*To be completed in about* 30 *numbers.*) London: John Van Voorst.

The object of this book is to serve as a *first book* for collectors of *Lepidoptera;* it is intended to teach them to read descriptions of species with the view of naming their specimens. Hitherto not one collector in a hundred has ever attempted this. The fault rested not entirely with the collector, because many of the published descriptions were unserviceable. A few wood-cuts are given in "the

Manual;" mainly with the view of making it showy and taking with those who would be afraid of a book without pictures—but it is not intended or expected that collectors should attempt to name their specimens solely from the wood-cuts.

Tabular views of the genera and families are given wherever practicable, with the view of facilitating the naming of specimens.

The generic characters are only briefly given, and only those which are most conspicuous are noticed; the structure of the palpi, the venation of the wings and other microscopic distinctions on which frequently the separation of genera has been founded, are not alluded to; they would have been misplaced in an elementary work.

At the commencement of each family or group some readable generalisations are introduced, and the attention of the incipient is called to the species he is first likely to meet with and the haunts they frequent, thus rendering as profitable as possible the collector's "first season."

That two thousand copies of each number are sold within the month, and that the sale of No. I. already exceeds 3,500, speaks favourably for the desire of information it manifests in the bulk of our collectors.

The first volume will close with the fourteenth number, which will bring the *Noctuina* to a conclusion.

Before commencing the *Geometrina* it is necessary to wait for the appearance of M. Guenée's work on that group. M. Guenée has so well worked through the *Noctuæ*, that it would be a sad pity, for want of a little patience, to be unable to avail ourselves of his labours among the *Geometræ*. On the appearance of his volumes on "the waves and carpets," we will at once set to work to carry out his arrangement in "the Manual," but in the interim we trust our readers, and the readers of "the Manual," will not be annoyed if a few months' interval occurs between the appearance of No. XIV. and of No. XV. "What is worth doing at all, is worth doing well;" and though as many of our readers are young, we cannot expect them to be overstocked with patience, we trust they will see the force of our reasoning.

ELEMENTS OF ENTOMOLOGY: An Outline of the Natural History and Classification of British Insects. By W. S. Dallas, F.L.S. *In sixpenny*

*monthly numbers of* 24 *pages.* 8*vo.* *Illustrated with woodcuts.* *Nos.* 1—3 (*to be completed in* 15 *numbers*).

LONDON: JOHN VAN VOORST.

Who is there among our elder readers who has not been asked probably a dozen times, "Can you recommend me any cheap, good general work on Entomology? and who is there that hasn't after consideration recommended some work such as Westwood's "Text Book" or Newman's "Grammar," not as the really good general work inquired for, but as *the best they could think of.* Mr. Dallas's book is intended to be the really good general work inquired for, and judging from what we have seen of it, it seems likely to answer the end in view. It has been the writer's aim to avoid dryness, and to steer clear of all intrusion of fanciful theories (for theories should carefully be eschewed by all writers of elementary works). It is a work which we cordially recommend to all parents in want of a solid yet readable book by which their children may learn something concerning all the tribes of insects found in this country.

Those who wish to learn anything about the insects which occur in every part of the globe *must* have recourse to Westwood's "Introduction to the Modern Classification of Insects;" and as the number of copies of that work remaining must now be much reduced, those who think they are likely to want the work will do well to apply early.

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From the Entomological works recently published on the Continent we have unfortunately only space to notice a few.

SYSTEMATISCHE BEARBEITUNG DER SCHMETTERLINGE VON EUROPA; ZUGLEICH ALS TEXT, REVISION UND SUPPLEMENT ZU JAKOB HUEBNER'S SAMMLUNG EUROPAEISCHER SCHMETTERLINGE. Von DR. G. A. W. HERRICH-SCHAEFFER. 6 *Vols.* 4*to.* *with* 636 *coloured Plates, and* 36 *outline Plates (of dissections).* *Price* 200 *Thalers, or* £30. REGENSBURG: G. J. MAINZ.

The year 1856 will long be memorable in the annals of Entomological literature, as the year in which Herrich-Schäffer's great work on the Lepidoptera of Europe, commenced in 1843, was happily brought to a conclusion.

Compared with all previously existing works on the same subject what a gigantic undertaking does it seem!

This work, as its title page informs us, serves as a Text, Revision and Supplement to Hübner's five volumes of Plates of the Lepidoptera of Europe. Hübner's work contains 790 coloured Plates, and Dr. Herrich-Schäffer now offers this valuable work (rendered even more valuable by his own critical remarks on the figures) at the reduced price of £30.

Descriptions of all the species hitherto detected in Europe, with remarks on their times of appearance, localities, and food plants; analytical tables of many of the genera and families; and the genera all characterized more or less critically; are sufficient to show that the letter-press has not been neglected, and that, though the magnificence and accuracy of many of the figures leaves nothing to be desired, the work has high claims to our attention for the intrinsic value of the letter-press.

We do not agree with Dr. Herrich-Schäffer in his Systematic arrangement; therefore we can the less be suspected of praising his work because it reflects our views. Indeed some parts of the arrangement appear *to us* fanciful and erroneous in the extreme; but it does not follow because *we* are unable to appreciate the novelties in the system here developed, that they really are blemishes. And certainly there is a conscientiousness about the work which we seek for in vain in the descriptive publications of Treitschke, Duponchel or Stephens. Herrich-Schäffer may not always have succeeded in his attempts, but his work impresses us with the conviction that he has earnestly worked at his subject. We do not find that towards the end it is written in a careless or slovenly manner.

Unfortunately so few of our British collectors study the Lepidoptera of *Europe*, that the sale of this magnificent work must always be very limited in this country. The large proportion of European *Bombyces* and *Noctuæ*, which do not occur in the British Isles, will deter many from purchasing this work, who, if the bulk of the European species had occurred here, would have been tempted to add such a literary *bijou* to their library.

Of the *Tortrices* a much larger pooportion are common both to us and to the Continent; and in the *Tineæ* it is only a few of the European species which are not likely to be found here.

Should it interest any one to know that the Fourth and Fifth Volumes, containing the Micro-Lepidoptera, with 214 coloured Plates, are to be had separately, we are commissioned* by Dr. Herrich-Schäffer, to receive orders for these two volumes for £9.

* If any one likes to favour me with an order for these two volumes, I will at once write to Dr. H. S. to forward them here. H. T. S.

## DIE TINEEN UND PTEROPHOREN DER SCHWEIZ. Von Professor Heinrich Frey. 8*vo.* *pp.* 430. *Price* 7*s.* 6*d.* Zurich: Meyer and Zeller.

A systematic descriptive work on the *Tineæ* and *Pterophori* of Switzerland, by one so fully qualified for the task as Professor Frey had already shown himself to be, is no unimportant addition to the already rich stores of German Entomological literature. Every fresh work which emanates from the brains of that deep-thinking and hard-studying race renders a knowledge of German literature more and more necessary to the earnest seeker after scientific truth. We cannot translate all the German works as fast as they appear, nor is it desirable that we should do so, since there is always a risk that in translation some of the force and precise meaning of the original writer will be lost. German is much more generally taught in schools than used formerly to be the case, but is it yet sufficiently so? Languages are easier learnt when we are young, than at a more advanced period of life, and the boy of fourteen may miss the golden opportunity, which the man of twenty-four will regret.

Frey divides the *Tineæ* into fifteen families:—I. *Exapatidæ;* II. *Tineidæ;* III. *Micropterygidæ;* IV. *Hyponomeutidæ;* V. *Plutellidæ;* VI. *Gelechidæ;* VII. *Œcophoridæ;* VIII. *Glyphipterygidæ;* IX. *Argyresthidæ;* X. *Coleophoridæ;* XI. *Gracilaridæ;* XII. *Elachistidæ;* XIII. *Lyonetidæ;* XIV. *Lithocolletidæ;* XV. *Nepticulidæ.* He has thus two families more than are admitted by Stainton in his volume of the Insecta Britannica, for Frey separates the genus *Micropteryx* from the *Tineidæ*, making of it a distinct family, *Micropterygidæ* (a position which probably few will feel disposed to deny to these singular insects); and he also separates the genera *Dasycera*, *Œcophora*, *Butalis*, *Pancalia* and *Endrosis* from the *Gelechidæ*, forming thereby his family *Œcophoridæ*, a step undoubtedly in the right direction, if only it can be maintained. Many of our readers, who were dissatisfied with the removal of the genus *Semioscopis* from its time-honoured place, will be pleased to hear that Frey returns it to the *Exapatidæ*, placing it immediately after *Chimabacche*.

One very gratifying feature we notice in Frey's work is, that from the increased number of observers throughout Europe of this group of insects during the last ten years, some progress has been made in establishing the geographical range of species. This must ever be one of the most interesting branches of the studies of an Entomologist; but before it can be attempted to be thoroughly followed up, not only must the number of observers in different

countries be increased, but they must learn to call the same insect by the same name, and therefore it is that the rectification of nomenclature, which to short-sighted individuals appears such a "much ado about nothing," is a most essential preliminary. It is not the be-all and end-all of Entomological inquiry, but it is absolutely necessary before further progress can be made. The astronomer before he makes an observation satisfies himself that his instruments are true and correct; for if not, of what use will be the observation? The Entomologist *must* act in like manner.

We would gladly see more local Faunas worked out as this of Frey's is done, and we trust the day is not distant when at least we shall have one from Frankfort on the Maine.

## FAUNE ENTOMOLOGIQUE FRANÇAISE, ou Description des Insectes qui se trouvent en France —Coleopteres. Par Leon Fairmaire et le Dr. A. Laboulbene. Paris: Deyrolle, Rue de la Monnaie, 19.

The third livraison of this work has appeared this summer; we are expecting a supply of it, but it has not yet come to hand, and therefore we can do no more than announce its publication.

## NATURGESCHICHTE DER INSECTEN DEUTSCHLANDS; begonnen von Dr. W. F. Erichson, fortgesetzt von Dr. H. Schaum, G. Kraatz, und H. Von Kiesenwetter. Erste Abtheilung—Coleoptera.

Mr. Janson has obliged me with the following notice of this work.

"Arrangements having been entered into with Dr. Schaum and MM. Kraatz and Von Kiesenwetter, to continue this important work so ably commenced by the late Dr. Erichson, but suspended since his lamented decease in 1848, these gentlemen appear to have entered on their labours in earnest.

"Dr. Schaum has undertaken the earlier families, and the first part of the volume devoted to them (vol. i.), containing the 'Cicindeletæ,' and a portion of the 'Carabici,' issued from the press in the summer.

"Of vol. ii., entrusted to Herr Kraatz, and comprising the

'Staphylinii,' etc. the first and second parts made their appearance simultaneously, and at the same period as the foregoing.

"Of Volume iv., by Herr Von Kiesenwetter, containing the 'Malacodermi,' etc., we look daily for the publication of the first instalment.

"The third volume, by Dr. Erichson, and on which the five concluding years of the brief but memorable career of the illustrious author were employed, was published in 1848: it contains the families 'Scaphidilia, Trichopterygia, Anisotomidæ, Phalacrides, Nitidulariæ, Colydii, Cucujipes, Cryptophagides, Mycetophagides, Byrrhii, Georyssi, Parnidæ, Heteroceridæ and Scarabæides.'

"This work, as its title indicates, is a Natural History of the Coleopterous Insects of Germany, and furnishes the student not only with full and careful descriptions of the genera and species indigenous to that country, together with an account of their earlier stages, physiology and habits, but also with much important information relative to those of other and distant lands.

"The high standing in the scientific world of the gentlemen engaged on this work renders any recommendation on our part superfluous; and the fact that, with a very few exceptions, all the species of Coleoptera found in this country are known as inhabitants of Germany likewise, will make it obvious to those occupied in investigating the British Coleoptera, that this is of all others the book which they should adopt as their guide and *vade mecum*, at all events until a new descriptive treatise in their own language can be elicited from our little band of working Coleopterists."

*On Saturday, April 4th,* 1857, *will be published*

# No. 27,

(THE FIRST NUMBER OF THE NEW VOLUME)

OF

# THE ENTOMOLOGIST'S

# WEEKLY INTELLIGENCER.

PRICE ONE PENNY.

To be continued weekly during the summer months (that is, till the end of September), for the purpose of instantaneous transmission, amongst the Entomologists of this country, of all important Entomological information.

Those who make any discoveries or captures of importance are requested to communicate at once to the Editor (Mr. H. T. Stainton), and all authenticated intelligence received by him prior to the Wednesday, will be published in the "Intelligencer" of the following Saturday.

Those who wish the "Intelligencer" forwarded by post on the day of publication are requested to transmit 4*s.* 4*d.* in postage stamps to E. Newman, 9, Devonshire Street, Bishopsgate Street, on or before March 20th, 1857.

Will be published every Saturday by E. Newman, 9, Devonshire Street, Bishopsgate Street, and by W. Kent & Co., 51, 52, Paternoster Row; and may be had of all Booksellers and Newsmen.

## A REVISED NOMENCLATURE

OF THE

**BRITISH SPECIES**

OF

GEODEPHAGA, HYDRODEPHAGA AND PART OF PHILHYDRIDA,

**WITH SYNONYMS, &C.**

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Printed by Taylor and Francis, Red Lion Court, Fleet Street, London, 1856.

During Mr. Clark's residence in the Brazils, copies may be obtained, post free for 12 stamps each, of Mr. Dawson, the Woodlands, near Bedford, or direct from the Printers.

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*Suitable for Presents, or Prizes for the Young.*

# JUNE;

## A BOOK FOR THE COUNTRY IN SUMMER TIME.

By H. T. STAINTON.

Foolscap 8vo., cloth, gilt, pp. 141. Price 3*s*. London: Longman & Co.

This little book, with its pleasant name and pretty cover, would appear intended to serve as a sort of decoy-duck to allure many a youngster to the pursuit of Natural History; no doubt in the first place merely as an amusement, but afterwards probably to some better purpose.

Perhaps the point most strongly urged is the desirability of school-girls learning something of botany, at any rate that portion has been most frequently quoted by reviewers as the best specimen of the book.

Those of our readers who wish to extend a love of Entomology amongst the rising generation are recommended to place "June" before those whom they wish to incite to such studies, as there is nothing alarming either in its title or in the mode in which the varied aspects of the country are sketched.

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# THE ENTOMOLOGIST'S ANNUAL

## FOR 1856.

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"It will be found of use to all votaries of the Science of Entomology—to tyros as well as to adepts, and not less to the latter than to the former."—*Morning Chronicle.*


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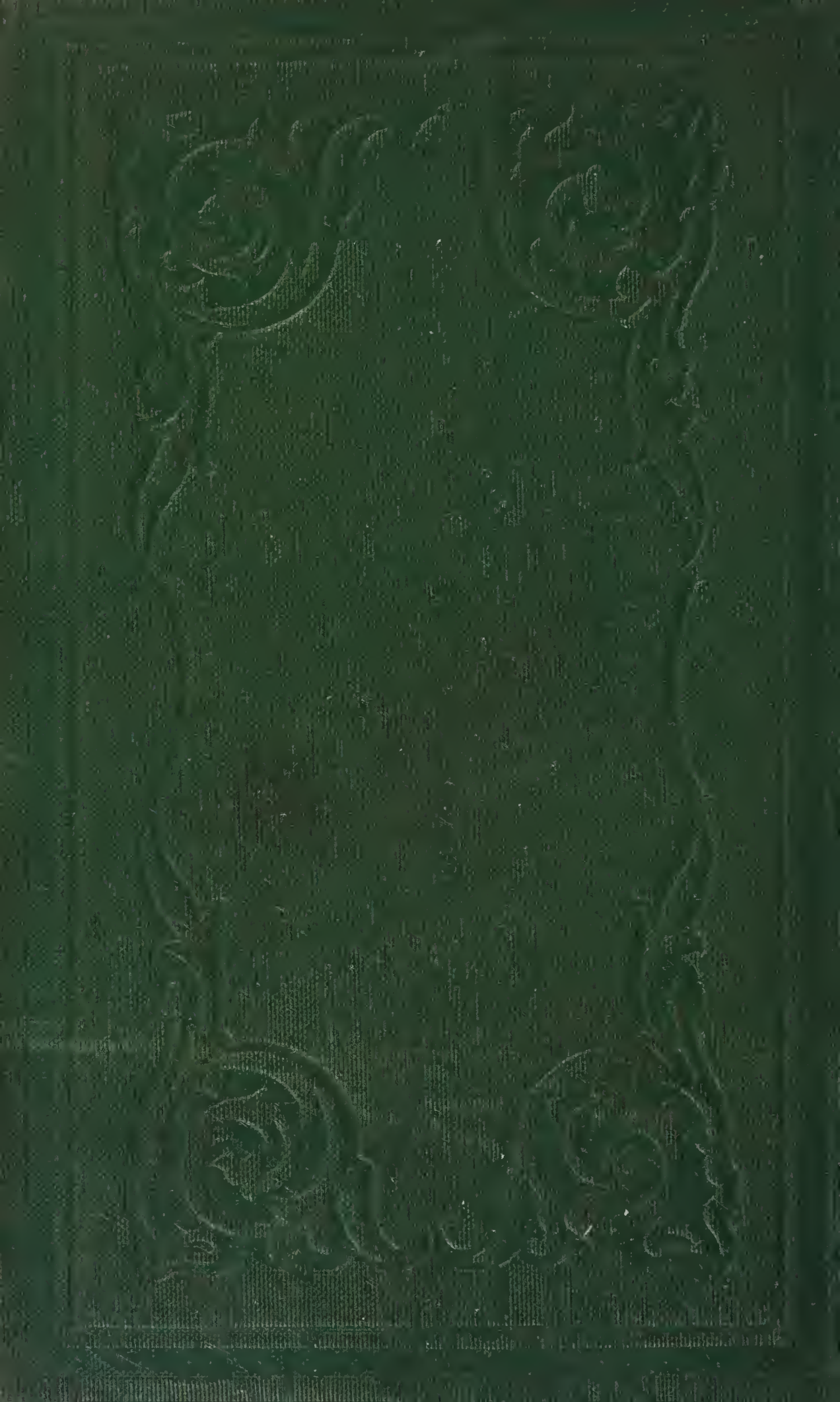
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